MODEL AIRPLANE NEWS

9th Year of Publication

FEBRUARY

1938

20c

The Heinkel Pursuit

"THE *powerful, dramatic* STORY of BURD'S *amazing* SUCCESS!"

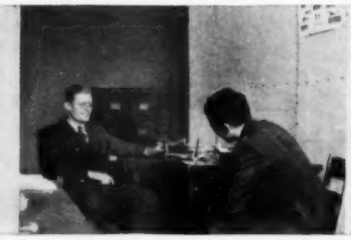
Designing is Creation. Designing is creation of a model. Here is one of BURD'S strategists, hard at work, breaking down a potential prize-winner. Years of experience; constant check and re-check; tremendous concentration throughout the many successive steps, in addition to building and rebuilding, are necessary to insure accuracy in the finished plan.

Circular Saw is Indispensable. Circular saw is indispensable, and a combination of a model builder and a saw-man is a real find. Yet, BURD employs only saw-men who are model builders. He is the key man of production. On him depends the success of the set from a material standpoint. In addition to fine cutting, he selects and grades wood for all requirements and must know at a glance what wood is most suitable for the job it must perform.

THE spectacular rise of BURD from o
security in two short years is attributed
one principal factor—"The ability to pr
duce modern types, from designing board
finished product, in such a way as to me
the longing of every model builder for t
set they have always wanted." We ha
gone directly into the factory on an or
nary work day, and here, for the first tim
bring you true unretouched photograp
(made by an amateur with box camera)
the actual workaday important steps
the life of these BURD models, from begi
ning to end. (The assistance of a loc
dealer and model builders were enlisted
complete the last steps.) Of course, we cou
not possibly vision for you the tremendo
detail, the tireless system, the ceasele
driving ambition to maintain, and ev
further, the leadership we have so definite
established. However, we sincerely subm
these photographs clearly visualizing wh
is back of every BURD set for your interes

To get a "BURD", see your nearest dea
er. If there are none close at hand to ser
you, write in direct, using the handy co
pon below.

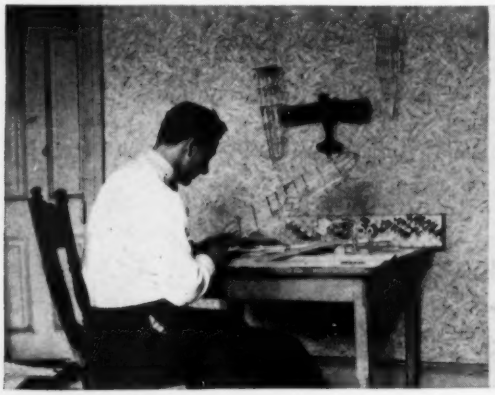
Selection and Grading. Selection and grading is carried still further in final assembly. These packers assemble many, many thousands of sets every week. They can tell you at a moment's notice the exact contents of any set—in BURD'S assortment of more than 50 types—the colors, numbers and sizes of strips, etc. A poorly printed wood sheet, an imperfection in some part, is noted and discarded without delay in assembly.



Selling the Dealer. Selling the dealer necessitates no high pressure sales talk. He is well acquainted with model products and readily recognizes BURD superiority. He gets from BURD efficient and pleasing cooperation which is passed along to the consumer. Here you see a pleasant conversation, during which the BURD dealer places an order covering his requirements.

The Retail Store. The retail store gives you the merchandise you want when you want it. For helpful, courteous service at all times, see your nearest dealer. He is there to serve you. Pictured here is one of BURD'S dealers. A large assortment of model merchandise is carried, and concerning BURD he says, "It's my greatest selling feature. Every time I sell a BURD a new model enthusiast is made."

"A Big Value." "A big value," the cust
says as he looks over the contents of a new B
50" flying model. "It's just what I've been
ing for. Wrap it up. I'll take it." Many
sets go over counters throughout the world
thirteen countries, and the same thoughts ar
pressed in six languages.



"Gee, that's a Hone

"And it actually flies
looks like a real plane.
bet that cost a pile
money . . . What, is t
all it costs? Where'd
get it? I'm going d
now and get a BURD
It's BURD for
always!"

"This is simple to build," says the modeler when he gets that set home and gets to working on it. "What's more, it isn't like the other sets I've had. There's more than enough of everything, and it's all fine quality material." (Here's where the designing, selection and grading are making themselves felt.)

DEALERS: Get This Money Making Line on Your Shelves at Once

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101-105 West Pratt Street, Baltimore, Maryland

IN ENGLAND: Elite Model Planes, 14 Bury New Rd., Manchester **IN AUSTRALIA:** K. D. C. Manufacturing Co., 113b Bathurst, Sydney
IN SOUTH AFRICA: Model Aircraft (Pty) Ltd., 23 Dock Rd., Cape Town **IN SWEDEN:** Sven Wentzel, Apelbergsgaten 54, Stockholm

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( ) BURGESS with free battery and prop add
( ) Models $1.00 p.p

5 feet Flying Models
( ) Curtiss Robin
( ) Fairchild "24"
( ) Rearwin Speedster

30" Flying Models $1.00 p.p
( ) Aeronca Model K
( ) Ryan ST
( ) Curtiss Hawk P6E
( ) Hawks' "Time Flies" $2.0
( ) Douglas Sleeper 2.0

30" Flying Models 50c p.p.
( ) Thermalidor Skyburd
( ) Mr. Mulligan
( ) Douglas 0SR
( ) Stinson SR7
( ) Curtiss Gulfhawk
( ) Aeronca C7O
( ) Boeing P26A

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The famous Baby Cyclone has beaten every engine in the world in competition and is the undisputed World's Champion.

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- Own the BEST engine in the world and win meets regularly.

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The BABY CYCLONE sells for $25.00 in all foreign countries except Canada

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ATTENTION C. C. MOSELEY, President
Sir: Please send me postpaid the following items checked. I enclose Post Office money order.

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◯ California "Chief" Kit, Complete, $7.90 (Kit weighs three pounds, wing span five feet)

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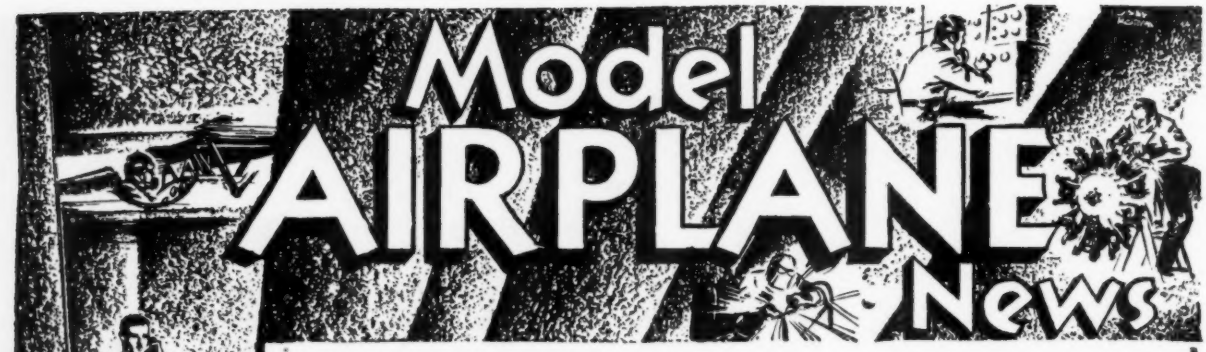

9th YEAR OF PUBLICATION

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CONTENTS

FEBRUARY, 1938

An American View of French Model Aviation
By Frank Zaic 4

A Stall-Proof Stick Tractor
By Raleigh T. Daniel 6

Eliminating Guesswork from "Prop" Building
By Gilbert MacLean 8

Frontiers of Aviation
Including: How to Build a Scale Model of the Vultee V-11-G.B.
By Robert C. Morrison 10

Modeling the Short Sky Liner
By Nick Limber 13

Timing Your Motor Run by Measured Fuel
By Roy Marquardt 13

"Gas Lines" 16

Build and Fly This Miniature "Cub"
By Jesse Davidson 18

Your Career in the Aircraft Factory
By Willis Nye 23

N.A.A. Junior Membership News 24

Designing Your Gas Model
By Charles Hampson Grant 27

Air Ways 28

Building a Flying Rearwin Sportster
By Herbert K. Weiss 30

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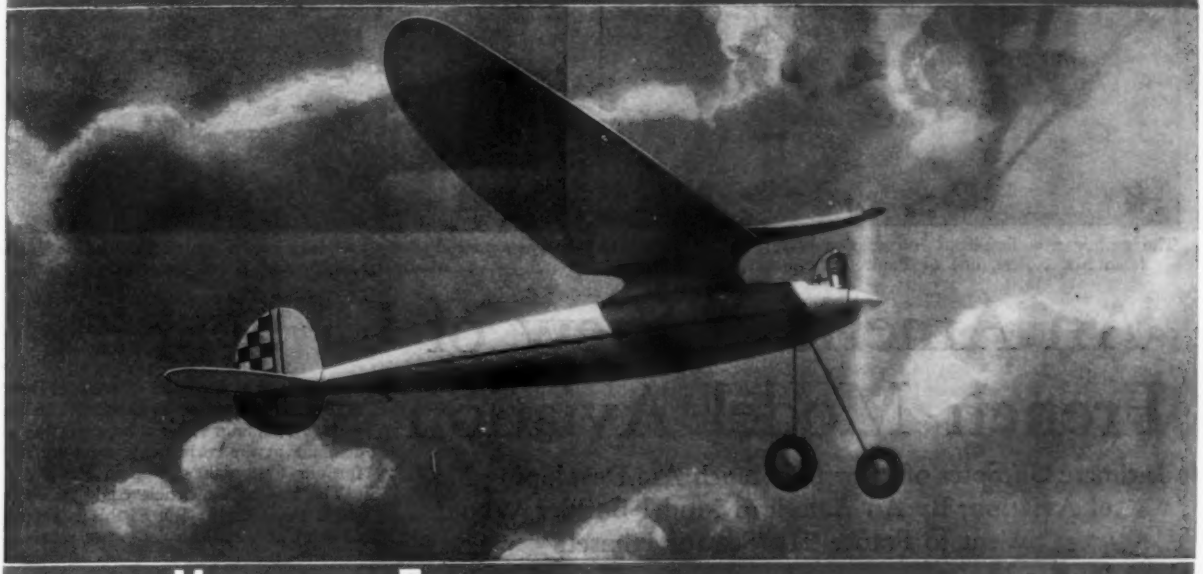

THE VALKYRIE GAS TYPE RUBBER POWERED MODEL AIRPLANE

The two pictures above illustrate the original full size "Valkyrie" Gas Model. This is one of the finest examples of modern streamlining ever produced. This model gave a remarkable performance at the 1937 Nationals and also awarded Second Place, right behind Maxwell Bassett's First Place entry.

WINGSPAN 24 in. LENGTH 15 in. WEIGHT 1¼ oz.

DESIGNED BY INDOOR CHAMPION CARL GOLDBERG

SCIENTIFIC introduced the Gas Type Rubber Powered Model Airplane a few months ago and now building and flying this type of model has become a popular sport with model builders everywhere. Thousands of them are building and flying this remarkable type of model and getting all the thrills and excitement of real gas model flight at a fraction of the cost.

The "Valkyrie" is an accurate replica of an actual contest winning gas model.—

LOOKS, FLIES and SOUNDS LIKE A REAL GAS MODEL!

Has Super-Streamlined Fuselage, Movable Control Surfaces and Shock-Proof Landing Gear

The "Valkyrie" incorporates all the attractive features and outstanding flying characteristics of its gas model original. It is a super-streamlined graceful, efficient, durable and consistent flyer and can be built easily and quickly by any model builder, requiring only 4 or 5 hours to construct.

FLIES

½ MILE

(2500 FEET)

The flying qualities of this model have been tested repeatedly and proven efficient. The high wing mounting and dihedral angle assure perfect performance.

The "Valkyrie" is sturdily built with wing root constructed into the under side of the wing and also into the fuselage, making an exceptionally strong assembly and assuring greater durability. Also includes the "Ratchet," a device that creates a sound resembling the hum of a real gas motor. The dummy motor is exceptionally realistic and when this model is in the air it cannot be distinguished from a genuine gas model. Beautifully colored with yellow fuselage and tail, black arrow on body, colored squares on rudder and yellow wing with attractive black and red flashes.

KIT is COMPLETE

INCLUDING SPECIAL BROWN CONTEST RUBBER

Contains everything required to build this model 100% complete. All ribs, bulkheads, fairings, and curved parts clearly printed on selected quality balsa; strip balsa carefully cut to accurate sizes; readymade wood cylinder with spark plug in one piece; all wood parts for constructing crankcase, exhaust pipe, air intake, throttle, etc.; pair of streamlined wood wheels; Tru-Pitch 7 in. machine cut balsa propeller; liberal quantities of cement, clear dope, Brown contest rubber; landing gear wire; flat and cup washers; 3 sheets of colored tissue; sheet aluminum; motor hooks; and all necessary metal for building the "Ratchet" motor-hum effect; soft wire for movable surfaces; also a set of easily understood full-size plans with detailed instructions including the construction of the dummy gasolene motor. Everything needed to complete the model and make construction as easy as possible.

SPECIAL TO DEALERS

This "Valkyrie" model is sure to repeat the popularity of the "Flea." If you are a regular SCIENTIFIC dealer, send your order at once at your regular discount, or write immediately for dealer discounts on this new winner.

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Remember to see your dealer first for your "Valkyrie" model kit. As this model is brand new, he may not yet have it in stock. Ask him to order it for you at once, or send your order direct to us.

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Containing full information on SCIENTIFIC gas models, gas engines, supplies and materials—all at money saving prices. Send today Postpaid 5c.

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See Page 37

for SCIENTIFIC Gas Models, Engines and Supplies. SCIENTIFIC is Gas Model Headquarters. See these money saving items on page 37!

The author gets first-hand information about French technique from Mr. Nestle, one of France's foremost glider pilots.

A gas model climbing for altitude at a contest held in the French Mountains, 4,000 feet above sea level.

An American View of French Model Aviation

Intimate Glimpses of How the French Are Developing Model Aviation, By An American Model Builder Who Went to France "To See for Himself"

By FRANK ZAIC

"SAY, I wonder if this train is going to Paris?"—"We were supposed to be there at eight and it's past nine now!"—"Doesn't anyone here know how to speak French?"—"Where can that conductor be now?"—"Well, boys, we might as well make ourselves comfortable. The train must be going somewhere."—"Wish this bench was made of balsa so that I could hack out a comfortable hollow."—And so on far into the evening as five Americans were wondering where they were while en route to Paris from the Wakefield Competition in London.

A model contest on L'Bonne d'Ordanche with the glider camp appearing in the background.

We finally chugged into Paris at midnight! And then we saw Mr. and Mrs. Denoes! What a sight for sleepy eyes! Gladness was mutual as they had been waiting for us since eight and we wondered if they would be able to calm their French temperament long enough to wait for four solid hours for the slower train since we telegraphed the arrival at eight. Bundling into two taxis we soon arrived at the hotel where Mr. Denoes made reservations for us as soon as he knew we were coming. After a bit of eating and drinking at the corner cafe we were ready for our first night's sleep in Paris.

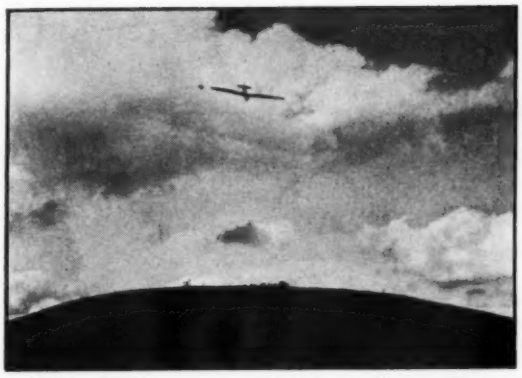
The rest of the article could be written about Paris itself. But as this is supposed to be about model airplanes, we reluctantly leave the trials and tribulations of five innocents abroad.

We arrived Saturday night and by the time Wednesday came we had a chance to see the Exposition, which by the way is grand, and several historic spots. On Wednesday we were picked up in a taxi and driven to a central spot where a big bus was waiting to take us and other French model builders to a model contest on the Caudron experimental airport. Up until then we felt like strangers but the moment we saw the model boxes and several of the boys whom we met in London we felt perfectly at home. On the way to the Caudron field we passed and visited Versailles where so much history was made. Some place! It was about 10:30 when we arrived at the field where some of the contestants were already testing their ships.

The rules for this particular contest were that the model must qualify to the weight rule of approximately 1 oz. per 36 sq. in. and the regular cross section requirement. The final result would be the average of two flights in form of points accumulated from a formula which incorporated the wing

Alvie Dague and Dick Bodle, American fliers at the Caudron contest, make ready Alvie's model for flight. (Left)

A long hike presents itself to these young men after launching their gliders from a hill like this one.



A high efficiency soarer in the air above L'Bonne d'Ordanche, France, a mountain free of trees and brush.

A powerful glider banking over the top of the launching hill. There are no trees for miles around.

loading. That is, if one model has a wing loading of 1 oz. for 36 sq. in. and another of 1 oz. for 20 sq. in., the heavier job needs but a trifle more than half of the lighter job duration to tie or win. This ruling was especially pleasing to the writer as his Wakefield job touched close to 11 oz. The prizes at stake, I believe, were 2,000 francs for first, 1,000 francs for second and 500 francs for third. This is money in any country, and I can just imagine how many boys would turn up for it at home, and how much excitement we would have! Well, we Americans were a bit nonplussed by the ease with which the contest started, and how nonchalantly the French boys went about in their preparations. We looked in vain for the characteristic Latin excitement.

We expected the meet to begin as soon as the weighing and drawing for numbers ended. But no, we had a leisurely lunch in the nearby village. Might as well mention that this was our first honest to goodness meal since we came to Paris. Not because we were guests but because we ate what the Frenchmen themselves usually have. Then a leisurely walk back to the field with a peep through the door of the experimental hangar where many of the famous Caudron racers are housed. It must have been close to one or two when we began to fly. But before describing the contest, a word about the model situation in France.

France is comparatively young in model building as we know it. It is quite possible that there were few model builders here and there for as long a time as aviation is in existence, but there was no sudden impetus to the hobby as we experienced in America in 1927. Rather, French building began in recent years. In 1934 Mr. Denoes attended the Wakefield Competition in England as a spectator, but in succeeding years France was represented in person. It is true that their early models were almost exactly like our own early attempts, but they quickly adapted themselves to the modern trend until now they have several seasoned experts who compare well with the best we have in America and England. Their contest winning machines can easily be mistaken for one of ours or English. But let it be said that they also have several features on their models which are their own developments.

One trend which is still prevailing is that of underpowering the model. This means that the design is not capable of taking high power. This point was especially evident at this contest because many of the new boys would have models that would climb under initial burst into a stall and then flounder into low altitudes. Very likely they adjust for glide, but do not use downthrust, nor shorten the rubber length or increase the stabilizer area to straighten the abnormally heavy tail while the model is in a stall. It is hoped that this will not be misread by our French friends as belittling remarks. This is more in a sense recalling our own early days when we had similar trouble. But with the coming of extra large stabilizers, plenty of dihedral (which takes care of the torque no matter what adjustments are made) and thrust adjustments, we were able to achieve the characteristic "American high climb." Although we had our lesson in fast climb but short power run during the Wakefield Competition, the high power brought in very many interesting problems. Since every rubber motor has a high power curve

(Continued on page 40)

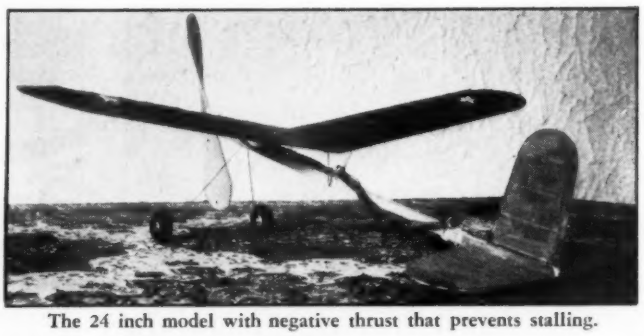
A French model glider weighing several pounds.

Mr. Paulin prepares his gas model for an airing. Mr. Guillet watches with a critical eye. (Right)

M. Fillon's Wakefield winner caught by the camera just after a a take off in the Caudron contest, France.

A Stall-Proof Stick Tractor

How You Can Build a High Efficiency Experimental Flier That Possesses Unusual Stability—It Will Give You Hours of Pleasure



The 24 inch model with negative thrust that prevents stalling.

By RALEIGH T. DANIEL

THIS model was designed with a view to producing an airplane for consistently well balanced and dependable flying. As to hard usage, if reasonably well built and adjusted, it can be flown indefinitely without crack-ups or major repairs.

The action photo of this ship will illustrate some of its flying ability. Those white clouds which appear in the picture are high above the Rockies. The model itself was launched at an elevation of more than 6,000 feet above sea level. However, the prevailing condition of dry air in this area helps compensate for the thin atmosphere.

In the description and instructions that follow, considerable attention is given to detail so that beginners will not have undue difficulty.

Construction

Wing

First draw a full sized outline of the wing. Also draw lines representing the position of each rib. Attach your drawing to a smooth board or even surface table top.

Now make a copy of the rib to use for a pattern. Cut 19 ribs from 1/32 sheet balsa making each one just a little oversized. Stack them together evenly and force pins through from each side to hold them together. The entire group of ribs is then sanded to agree in shape with the pattern. Use sandpaper wrapped around a rectangular block. Make a final check of rib shape by the original drawing.

Select straight balsa strips for the spars. Cut them to length and secure in place on the drawing using pins or thumb-tacks or both. Put the ribs in place. It will be necessary to slip a strip of material under the front spar in order to raise it high enough to butt the ribs properly. Cement the ribs and spars securely together, omitting the center rib until later. Use several applications of cement.

The tips are made preferably of bamboo but if you have difficulty in working it, then use 1/16 sheet balsa as shown. The principal advantage of bamboo lies in its toughness and will protect the wing in cases where balsa would not. If sheet balsa is used for a tip, stiffen it up with a straight bamboo strip as shown.

Do not disturb the wing until the cement is thoroughly dry. The spars can then be sanded to shape. Cut partly through each spar at the center, underside and crack them to raise each tip 2 3/16". Hold them in this position by placing weights on top at the center and near each tip. Slide blocks under the tips in such a manner as to raise them the correct amount.

The wing center section is reinforced by use of pieces "H, H" cut from 1/16" sheet. These are attached as shown in detail "A". Now is the time to see that the wing is true and to check and adjust it. It is very important that neither half be warped. When the cement has dried well, the wing may be taken up and the parts "H" trimmed down until they coincide in shape with the spars. The center ribs should be put in now and also the 1/16 x 1/16" spar.

Make four wing cleats from 1/32" sheet dural or aluminum. Attach these in place on the spars using thread and cement.

The wing is now ready to be covered. Cut the tissue oversize and trim off later. Tissue cement is preferred for sticking the tissue on. Apply it to the wood with a small brush. Cover the bottom from the center rib to the tip with a single piece of tissue and likewise the top. Thus four separate pieces are required to cover the entire surface. However, a smoother job can be obtained by taking a section from the center to the outermost rib and using another piece over the tip. In the latter case the wing is divided into eight cover sections.

The model in full flight, 6,000 ft. above sea level.

The finished wing may be lightly sprayed with water to tighten the covering. Use moderately. Later on it is advisable to dope the paper as it is thereby toughened and made more nearly air-tight. If used wisely, the dope will not produce excessive weight.

The trouble at the bottom of many poor cover jobs lies in the fact that the builder tries to cover too large an area with a single piece of tissue. This is especially true where the shape of the framework changes abruptly or where there are compound curves.

Tail Structure

Make a full size drawing of the fin and stabilizer and follow a similar procedure with the tail frames as described for the wing. The ribs should give little difficulty since they are not curved, necessarily. However, the ribs may be given streamlined shape if desired and they are thus made a little more efficient. It is recommended that the beginner use the simpler ribs as shown. For typical rib shapes see sections B-B and C-C. Make ribs of 1/32" sheet balsa, medium weight.

The stabilizer and fin tips are cut from 1/16" sheet balsa, fairly soft. Sanding the spars should be the last operation before covering the structure. Cover the fin with tissue on both sides. Cover the stabilizer on top only unless curved ribs are used.

The tail booms are cemented on top of the stabilizer. Trim off a small space of tissue in four places on top of the stabilizer spars where the tail booms are to rest. This is to make a firm joint, for were the parts merely cemented onto the paper they would pull off. The fin is attached on top of the stabilizer and between the 1/16 x ¼" booms. For installation see detail "K".

Miscellaneous

Make the tail skid and wing clips from music wire. Make a full size landing gear outline on paper and bend the wire to match.

Make a motor guide from 1/32" sheet dural or plain aluminum. Form the circular part by bending around a rod or the like. Secure about midway under the wing onto the motor stick, using thread only.

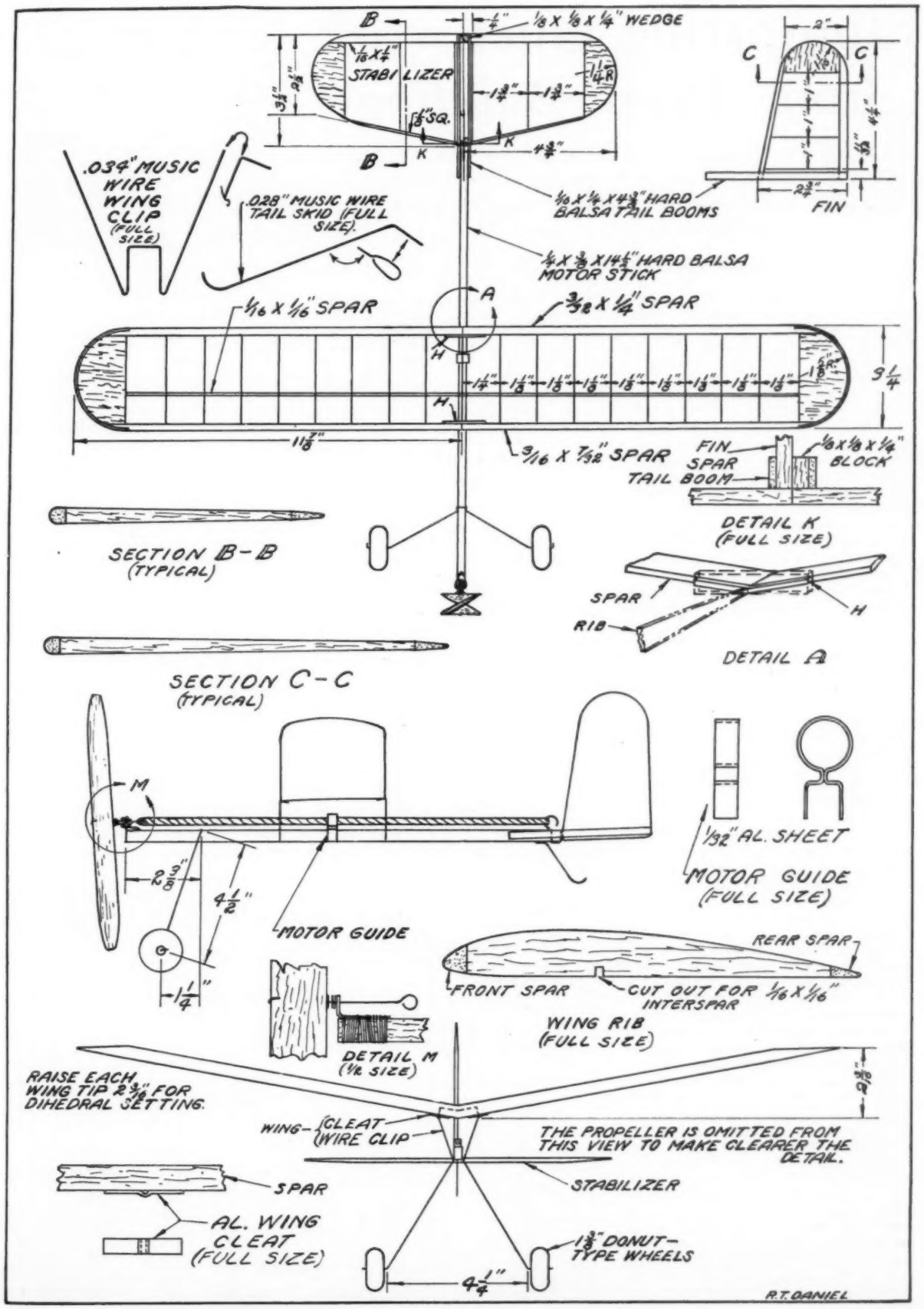
Use a propeller shaft as a rear motor hook. Push it through the motor stick from the top near the rear end and bend at 90 degrees rearwardly and cut off. Cement it and bind with No. 50 thread. Attach the tail skid also with thread and cement.

Cement a 3/16 O.D. washer on each side of each wheel hub. Line the washers up by passing a pin through them and the wheel hub. For the sake of a good finish and fine appearance, smooth off the wheel surface with fine grit sandpaper and apply several coats of black dope. The wheels are then put on the axles and the music wire is bent rearwardly and cut off.

Put the landing gear on the motor stick and secure with generous applications of cement and thread. True it up before the cement dries.

Use a 9" diameter propeller having a pitch of about 14½". This may be cut from

(Continued on page 50)


B
1/4"
1/8 X 1/8 X 1/4" WEDGE
1/16 X 4"
STABILIZER
1 1/4 R
1 3/4"
1 3/4"
1/8" SQ.
3 1/2"
2 1/2"
K
4 3/4"
B
.034" MUSIC WIRE WING CLIP (FULL SIZE)
.028" MUSIC WIRE TAIL SKID (FULL SIZE).
1/8 X 1/4 X 4 3/4" HARD BALSA TAIL BOOMS
1/4 X 3/8 X 14 1/2" HARD BALSA MOTOR STICK
C
C
2"
1/16
1"
1"
1"
4 1/2"
1/2"
2 3/4"
FIN
A
1/16 X 1/16" SPAR
3/32 X 1/4" SPAR
H
H
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1 5/16 R
9 1/4
11 7/8"
3/16 X 7/32" SPAR
FIN SPAR
TAIL BOOM
1/8 X 1/8 X 1/4" BLOCK
DETAIL K (FULL SIZE)
SECTION B-B (TYPICAL)
SPAR
RIB
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DETAIL A
SECTION C-C (TYPICAL)
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2 3/8"
4 1/2"
1 1/4"
MOTOR GUIDE
1/32" AL. SHEET
MOTOR GUIDE (FULL SIZE)
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FRONT SPAR
CUT OUT FOR 1/16 X 1/16" INTERSPAR
WING RIB (FULL SIZE)
DETAIL M (1/2 SIZE)
RAISE EACH WING TIP 2 3/16" FOR DIHEDRAL SETTING.
2 3/16"
WING-
CLEAT
WIRE CLIP
THE PROPELLER IS OMITTED FROM THIS VIEW TO MAKE CLEARER THE DETAIL.
STABILIZER
SPAR
AL. WING CLEAT (FULL SIZE)
1 3/4" DONUT-TYPE WHEELS
4 1/4"
R.T. DANIEL

Eliminating Guesswork from "Prop" Building

A Graphical Method of Determining With Vital Accuracy the Correct Proportions of Your Propellers Without the Use of Formulas So That They Will Possess the Exact Pitch and Blade Area You May Desire

By GILBERT MacLEAN

HERE is something that will serve as a fascinating aeronautical crossword puzzle for model designers and will provide information of vital importance to them as well. It is not difficult to determine the correct values of propeller diameter, pitch and blade for any particular model by the application of simple rules of design given in the articles on model design by Mr. Charles H. Grant, but—and this is a large "but"—how can a propeller be cut out so that it possesses the specified qualities to the proper degree? Only too often the model designer GUESSES at how the propeller should be cut to give the correct pitch and blade area. Of course the correct dimensions of the block, from which a specific propeller may be cut, can be determined by means of formulas. However, some designers find it difficult to understand and solve formulas accurately. It may be said truthfully that the model designer seldom knows, before the propeller is carved, just what the exact pitch and blade area will be after the propeller has been finished. Well, here is an instrument of design that will take the mystery out of the problem. It provides a simple and accurate method of determining the exact measurements of the block from which to cut a propeller of any required specification of diameter, pitch or blade area. This instrument takes the form of a graph which appears on the opposite page. Actually it is a combination of several graphs so joined together that it shows the relationship, geometrically, of all the design factors involved in the problem.

When any specific problem is worked out by means of a graph the answer is given in terms of the length, the width and the depth of the block from which the propeller is to be cut. Under these conditions it is necessary that a definite method of cutting the propeller from the block is followed. This graph is based on the use of what is known as the "diagonal method" of cutting. This method is worked out as follows: When the measurements of the block have been determined, diagonals are drawn from the opposite corners on each wide face of the block. The diagonals slant upward to the left in the case of a right-handed propeller, and represent the leading and trailing edges of the propeller blades. When the propeller is cut out from the block these diagonals serve as guide lines. The surfaces of the blades extend from the diagonal on one face of the block to the diagonal on the opposite face. Figure No. 30 shows the block (ABER) in dotted lines. On the front face the diagonal is (BR). On the rear face the diagonal runs from S to D. The propeller which is to be cut out from this block is shown within the block in heavy lines. In order to determine the exact center or axis of the propeller a diagonal should be drawn from E to A. The center of the propeller is the point where diagonal (EA) crosses diagonal (BR). This is shown on the figure at X. On the rear face the diagonals (SD) and (FC) cross at Y.

In order that the propeller will have the characteristic values indicated by the answer obtained from the graph, it must be cut out from the block as shown on the figure. The length of the block is taken as the diameter D of the propeller. The depth of the block is RF and the width is RE or FS. The quantities on the graph are given in terms of depth, width, diameter, pitch and blade area. The first two quantities, in the first method of operating the graph, are unknown and are to be determined. The last three quantities are known. The unknown quantities may be determined by proper use of the last three while working out your problem on the graph.

If you cut out the propeller from the block by any other method than the diagonal method as explained here, your answer will not be correct without further compensating calculations which will be explained later. Figure No. 31 shows the completed propeller after it has been cut from the block. The illustration also shows how the hub or the center part of the propeller can be cut away in order to eliminate the inefficient part of the blade surface. The dotted line from U to V shows how the propeller is shaped before it is cut away to form the figure indicated by the heavy lines.

Now let us learn something about the graph.

In the upper part the diagonal lines indicate the blade angle for a propeller of any given pitch and diameter. The diagonal lines of the upper graph are continued down over the center graph. In this graph the diagonal blade angle lines indicate what the width and depth of the block must be for any particular blade angle. In this case the angle of the blade is measured at the tip or end of the block. In order to determine the width and depth of the propeller block from which to cut a propeller of a certain blade angle, merely select any point on the diagonal line that represents the blade angle required and read the value for width at the left of the center graph and the value of the depth at the bottom. A point chosen between the diagonal lines will give the readings for a blade angle, the value of which lies between the values of the two adjacent blade angle lines.

In Figure No. 30 the width of the block shown is indicated by (AB), the depth by (AD). The diagonal (BD) indicates the blade angle at the tip of the propeller and is represented on the graph by any one of the diagonal lines running from the lower left part of the center graph upward to the right. The length of (AB) relative to (AD) determines the blade angle and consequently the slant of the diagonal which indicates the blade angle.

If on the graph, the line (AB) is 1, the point A of the block would be represented by a point on the center graph which is opposite 1 in the (A) column and which is at the left and vertical edge of the graph. If the blade angle is such that (D) is (½ W), then the point D of the block would be four squares to the left of 1 on the line running horizontally from 1. This point lies on the 4th diagonal line reading from the left. This shows how the blade angle determines the relative value of the width W to the depth D.

You will notice that there are curved lines plotted

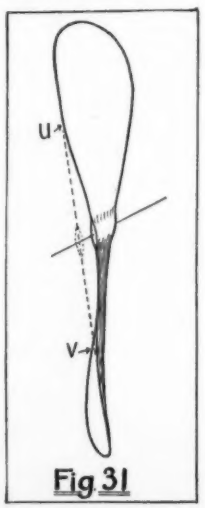


Fig 31

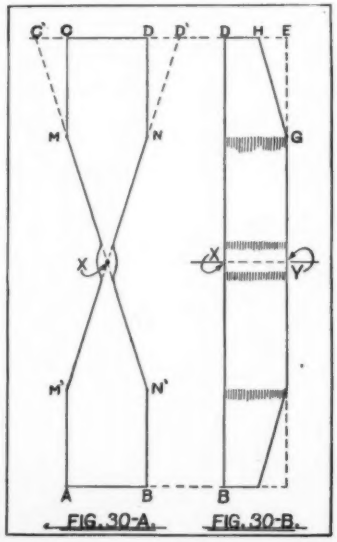


FIG. 30-A. FIG. 30-B.

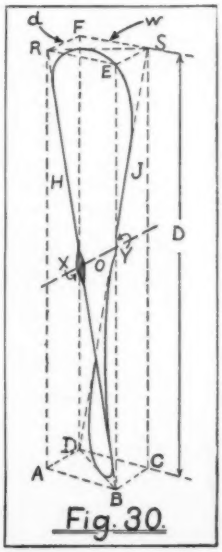
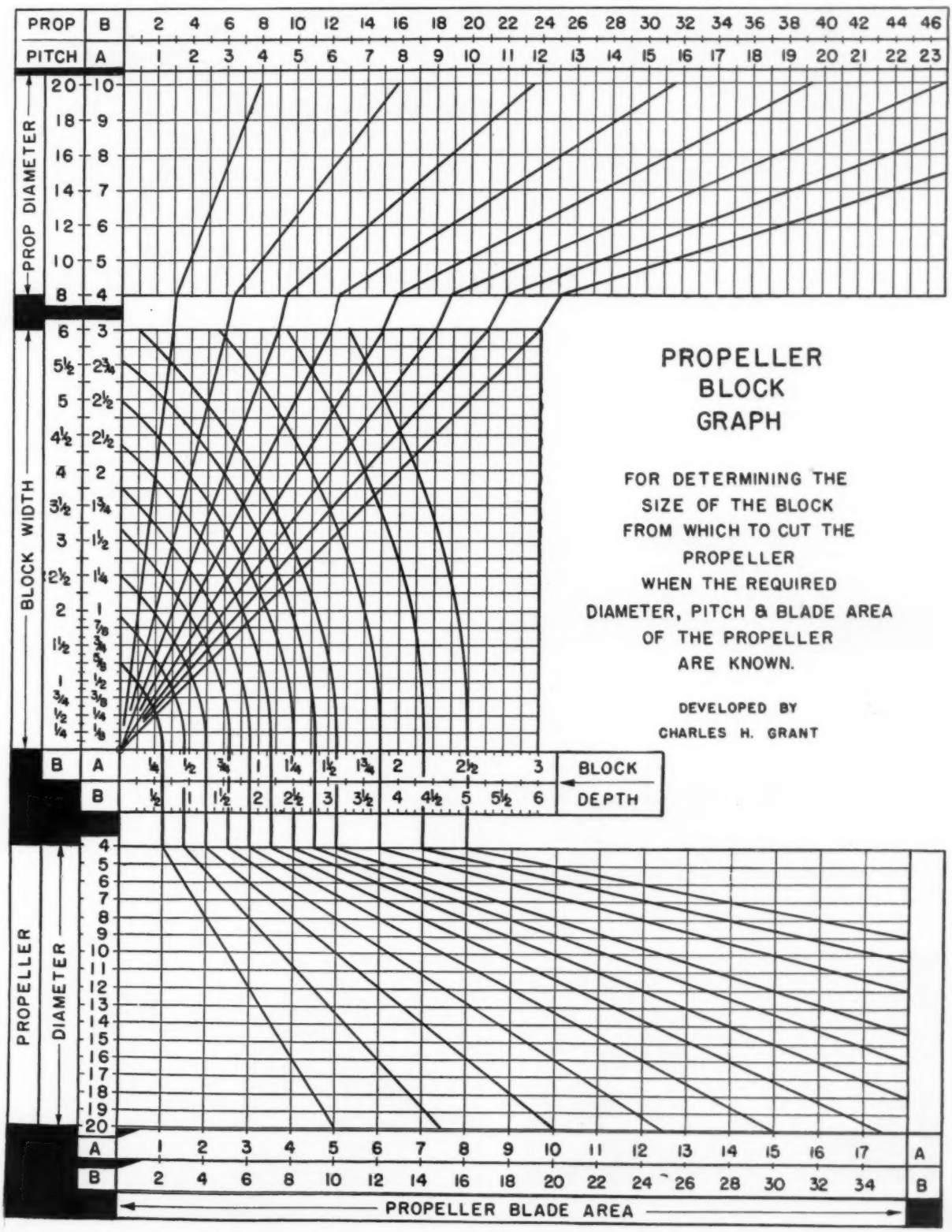
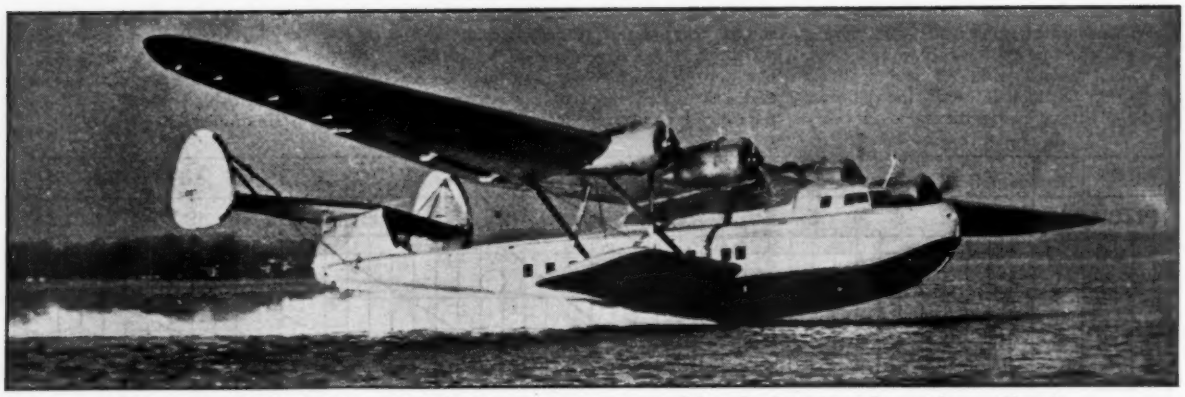


Fig. 30.

across the face of the center graph also. These are lines of *equal blade area*. Every point on any *one* of these lines represent, in terms of block width W and depth D blocks "of equal blade area," the diameter of the propeller being the same in every case. For instance every point on the seventh curved line, reading from left to right, gives the dimensions of a propeller block, from which a propeller may be cut that has a blade area of one square inch for every inch of propeller diameter. In the case of a propeller eight inches in diameter, a point on this line will represent in terms of "W" and "D" a block from which a propeller may be cut, that will have eight square inches of blade area.

(Continued on page 44)


PROP
PITCH
B
A
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
PROP DIAMETER
20 18 16 14 12 10 8
10 9 8 7 6 5 4
BLOCK WIDTH
6 5½ 5 4½ 4 3½ 3 2½ 2 1½ 1 ¾ ½ ⅜ ¼ ⅛
3 2¾ 2½ 2½ 2 1¾ 1½ 1¼ 1 ⅞ ¾ ⅝ ½ ⅜ ¼ ⅛
PROPELLER BLOCK GRAPH
FOR DETERMINING THE SIZE OF THE BLOCK FROM WHICH TO CUT THE PROPELLER WHEN THE REQUIRED DIAMETER, PITCH & BLADE AREA OF THE PROPELLER ARE KNOWN.
DEVELOPED BY CHARLES H. GRANT
B
A
¼ ½ ⅜ 1 1¼ 1½ 1¾ 2 2½ 3
BLOCK
B
½ 1 1½ 2 2½ 3 3½ 4 4½ 5 5½ 6
DEPTH
PROPELLER DIAMETER
4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
A
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
A
B
2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34
B
PROPELLER BLADE AREA

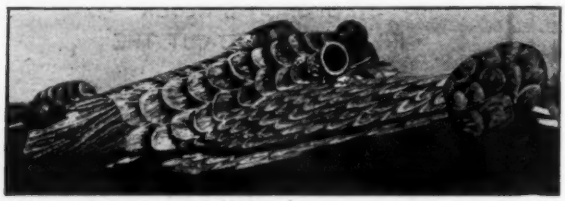


The new 31 ton Martin Clipper built for the Soviet government driven by four 1,000 hp. engines. (Acme)

Frontiers of Aviation

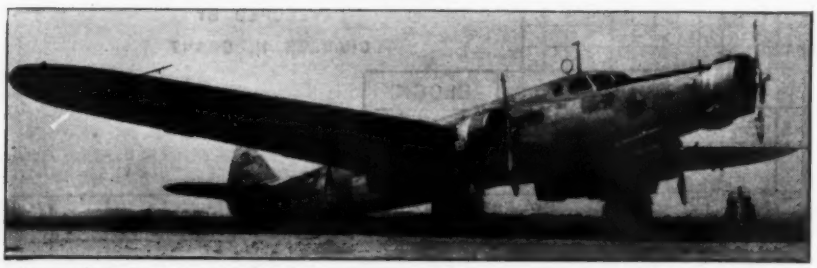
By ROBERT C. MORRISON

THIS month our accent will be mostly on German and Italian aircraft. The Italians must have read our comments a couple of months ago when we said something about the Italian aircraft industry not being worth a row of pins for darned if they didn't stage a show in Milan to show the world just what they did have. Germany of course was the most distinguished visitor at the show and tried to overdo herself with an array of good-looking airplanes also. In brief, the show was an exhibition of how Hitler and Mussolini were preparing for the Great European Slaughter which will probably be staged simultaneously with our World's Fair in New York. From every corner or crevice of the airplanes protruded ugly-looking machine-guns or aircraft cannon. It was a good show for the kiddies who have grown tired of playing cops and robbers and the more modern game of G-Man for they could get a lot of new ideas. One astonishing thing which especially concerns Germany is that there seemed to be no efforts to keep these new war machines at all secretive. Of course here and there parts of the ships were covered but on the whole the works were right there for anyone to peruse at random. Even Heinkel's HE 112 was there in all its glory. For awhile we really thought we had a story for you on this new "secret and super" Heinkel pursuit. However, you have to admit that we did bring you the first news of this airplane while it was still on the secret list. Why Germany has not resorted to cloaking her aircraft in the usual mystery category means one of two things. Either that she does not think they are good enough for her air force or else she is making a pressed bid for export business.



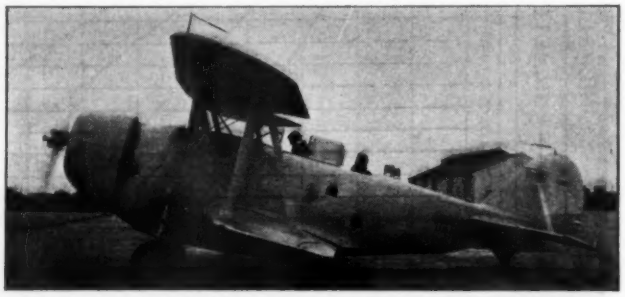
What is this? Just a new Russian tailless twin engine fighter with front and rear turrets. (Sovfoto)

Wherever we go these days we usually find Germany with a finger also in the export trade. She has not as yet given us much to worry about though but has kept us on our toes or in other words you might call Germany the Tasty-Yeast of the American aircraft export business. Ernst Udet has had more to say than usual about the German air force and is perhaps responsible for some of the aircraft Germany is now offering to the world at large. For example—the new four-engined Dornier bomber would not be accepted by the government according to what we have been able to glean from German sources, and instead it has been put on the export list. Udet, who has spent most of 1937 recovering from one serious air crash after another in which he barely escaped with his life, apparently does not believe in four-engined bombers as they are too big to be practical as fighting machines, to which



A new French trimotor long distance transport for 22 passengers. Note how Europeans have followed Americans. (Monkmeyer)

One of the latest Grumman fighters with new Marine Corps markings. (Shipp to Morrison)



The Great Lakes XBZG-1, the latest Marine Corps fighter, Twin Wasp-powered. (Shipp to Morrison)

The Focke-Wulf twin autogyro. The Germans say it can out-perform any other autogyro, remaining stationary in the air if necessary. (Acme)

The new "Aircuda" goes through its trial flights at Wright Field. Note the two light cannons in the nacelles. (Acme)

How the Latest Planes of Germany and Italy Compare With American Fighting Craft—How You Can Build a Scale Model of the Vultee V-11-GB

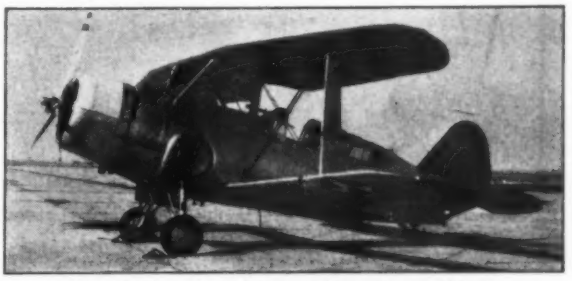
A Vultee attack test plane for Turkey, equipped with special baragraphs for dive testing. (Morrison)

we very much disagree. And by the way the U. S. Army Air Corps has just ordered thirteen more Boeing four-engined bombers to make a total of thirty-nine.

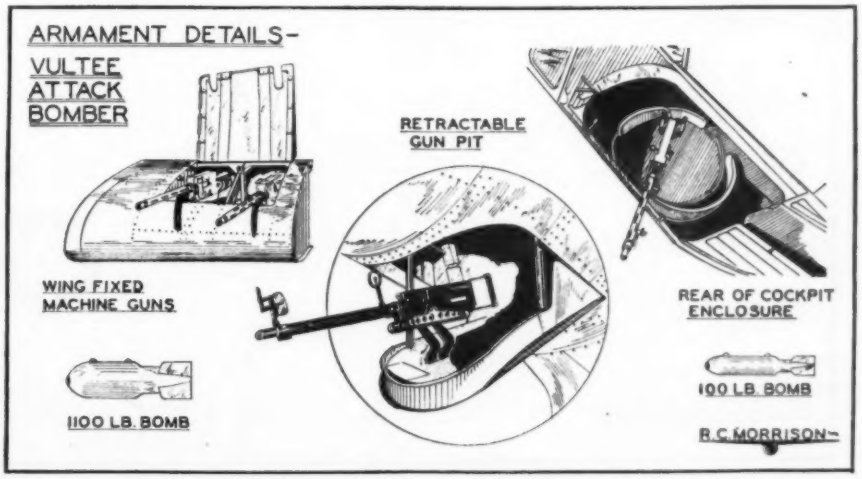
Before we get down to the bare facts of the planes at the show there is another point worthy of much consideration, and that pertains to manufacturing tools and raw material. In spite of the fact that Italy is very many miles from the United States, nevertheless we had over 60 exhibitors of accessories and tools for the manufacture of aircraft. In this line the only other predominant country is Germany who has always been noted for her engineering genius. But then Germany is at a disadvantage as she does not have the abundance of raw material that we have, and it is here that we can more or less hold world aviation in the palm of our hand—even if some country does happen to design better aircraft than ours!

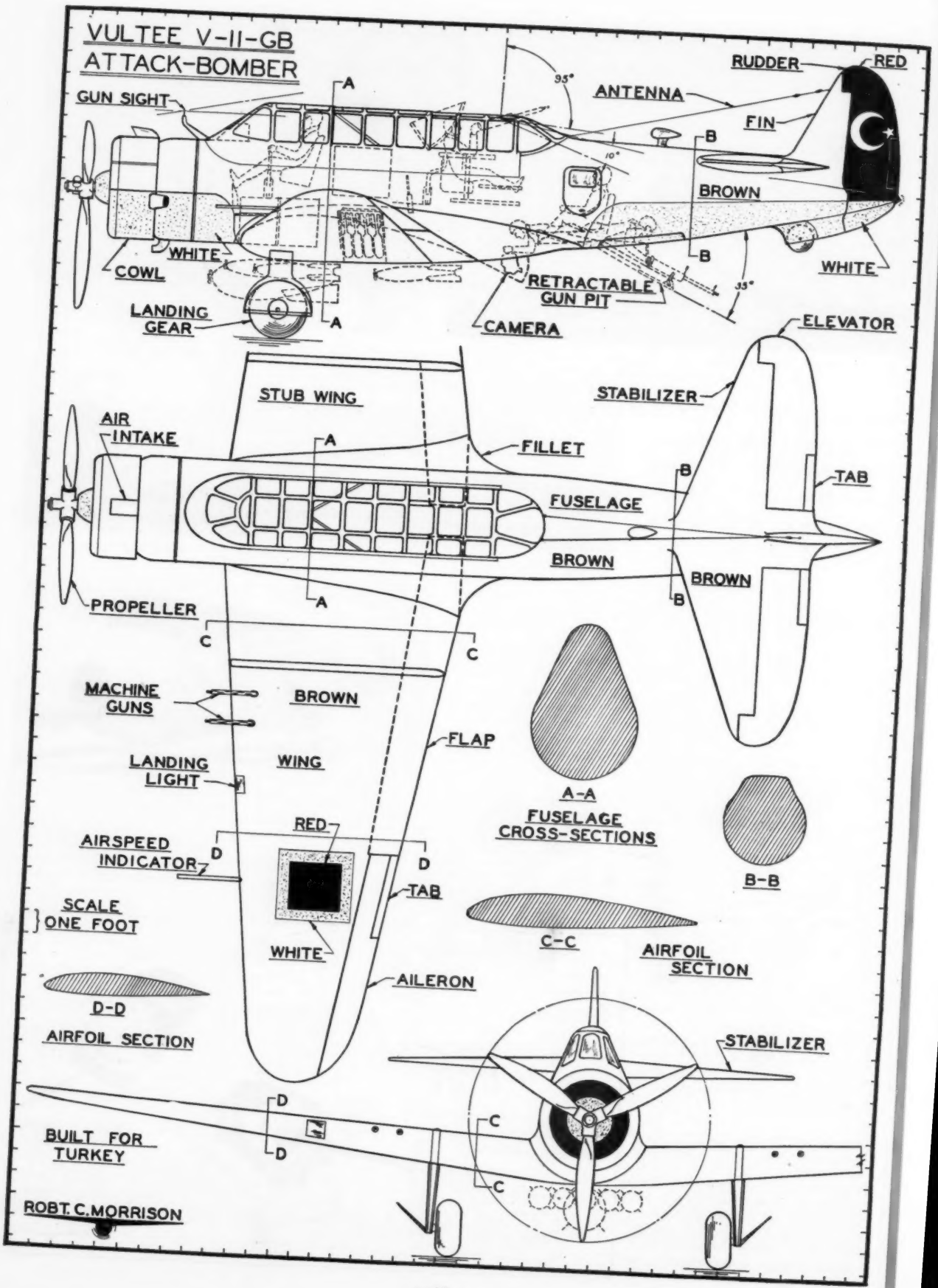
Since Italy gave the show at Milan, the best one since the Paris Show last year, we might describe her aircraft first. The most popular war plane in Italy and perhaps in all Europe is the light twin-engined bomber. Those at the show were the Bergamaschi, Breda 82, Caproni CA135, Fiat B.R.20, and the Piaggio P.32. The Bergamaschi is the only training bomber of the group and is a low-wing ship with very smooth lines but of the usual Italian styling. Trainer or no, the gun turrets look rather small to accommodate a human being in any manner than the horizontal one, and then they would need a shoe horn to get him in. But that is the general appearance of most gun turrets, even our own. They tell us the Italian gunners curl up in sardine cans for an hour each day to keep in trim. The French, who were very much absent at the show, have the right idea in gun turrets though. They build theirs so they can hold a whole tea party in one and are often referred to as green houses, sun porches, or aquariums. There has not been much attention paid to the retractable gun turret as employed in this country such as on our Douglas, Northrop, and Vultee bombers. On the new Vultee attack bomber, several of which are now being built for Turkey, the gunner is dropped down from the "belly" and has a very wide range. The interior of the cabin is more spacious than it appears from the outside with enough room for four or five men to take pot shots at will. The rear pilot seat may be folded up against the cabin wall allowing additional

(Continued on page 48)



The Curtiss SBC-3 for aircraft carriers. (Shipp)




VULTEE V-11-GB
ATTACK-BOMBER
GUN SIGHT
A
95°
ANTENNA
RUDDER
RED
FIN
B
10°
BROWN
WHITE
COWL
B
WHITE
RETRACTABLE
GUN PIT
35°
LANDING
GEAR
A
CAMERA
ELEVATOR
STUB WING
STABILIZER
AIR
INTAKE
A
FILLET
B
TAB
FUSELAGE
BROWN
BROWN
B
PROPELLER
A
C
C
MACHINE
GUNS
BROWN
FLAP
LANDING
LIGHT
WING
A-A
FUSELAGE
CROSS-SECTIONS
RED
AIRSPEED
INDICATOR
D
D
B-B
TAB
SCALE
ONE FOOT
WHITE
C-C
AIRFOIL
SECTION
AILERON
D-D
AIRFOIL SECTION
STABILIZER
D
C
BUILT FOR
TURKEY
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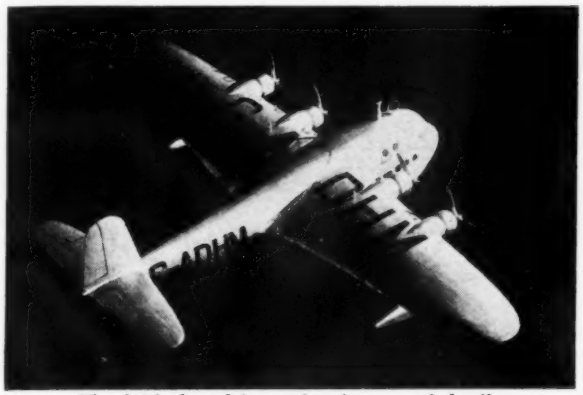
C
ROBT. C. MORRISON



The finished model complete in external detail.

When carefully finished it is exceedingly realistic.

Modeling the Short Sky Liner

Highlights of Britain's New Trans-Atlantic Flying Boats and How to Build a Solid Scale Model of One

By NICK LIMBER

DETERMINED to gain supremacy in the air, Great Britain has entrusted to Short Brothers Ltd., the building of her new super flying boat fleet.

The flying boats will embody the latest equipment available so as to insure safety, speed and economy. The boats are in the opinion of experts, the finest all-round flying boats in the world. This however is readily understood after considering the achievements of the "Caledonia," the second of the fleet of twenty-nine.

Powered with four Pegasus engines and equipped with De Havilland variable pitch propellers, the ship maintains a maximum speed of 200 m.p.h. It carries 24 passengers and a crew of five. It has spanned the Atlantic and its performance has shown that trans-oceanic flights are soon to become a safe and profitable venture. Its fine design and construction is indeed a triumph for British aeronautical skill. It has also proven itself ideal for carrying the tremendous amounts of mail that will result from the government's decision of all mail by air scheme.

The new flying boats are two deck affairs with the passengers in the lower deck and the crew in the upper. Promenade deck, wide view windows, salons, smokers' lounge and model kitchen may be found on the lower deck. The ships boast a wing span of 114' and a length of 88.5'. Their tremendous speed is expected to reduce all schedules on the Imperial Airways route.

Journeys from England to India are expected to require only 2½ days instead of 6 as at present. Singapore and Cape Town will be brought closer by a reduction of 50% in the time required to fly between the two points. Australia will be brought about a week away from England and the entire British commonweath will be in closer contact with the mother land than ever before.

Speed, safety, comfort and economy, all embodied in these super liners of the skies. Is it any wonder that experts proclaim them the world's best flying boats?

Drawings of the Caledonia are ⅛" scale and can be considered as full size for the model. First we carve the fuselage. A block of balsa 11¼ x 2¼ x 1½ is used for the body. Trace from the plans to the block and the side view of the fuselage. After this is accomplished cut away the excess wood and proceed to sandpaper the newly cut surface. Now trace the top view and follow the same process.

The next step is to shape the fuselage as shown in the cross sections. (Note that only half of each cross section is furnished in plans.) This is accomplished by cutting away as much excess balsa as possible and then sanding it down with rough sandpaper. Now finish the operation with smooth sandpaper and start making the wings of the ship.

Wing

The wing of our craft is constructed of two pieces of balsa 6½ x 3½ x ⅝ each.

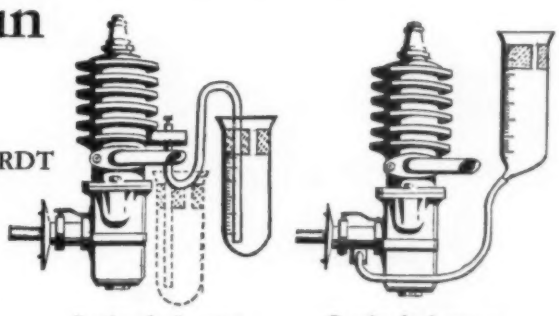
(Continued on page 38)

Timing Your Motor Run By Measured Fuel

By ROY MARQUARDT

YOU are competing in the 30 second motor run event at the '37 Nationals! You have just gotten your gas job off to what seems sure to be the best flight of the day! Your model circles higher and higher—27 seconds . . . 28 . . . 29 . . . 30 . . . 31 . . . 32 . . . 35 . . . 40 . . . your motor roars on. YOU FORGOT TO ADJUST THE TIMER! Possibly you have just filled the tank and your model sails away for good—the writer watched it happen dozens of times last summer.

Unfortunately the above mentioned "human error" is not the automatic timer's only fault. The air operated ones have proven completely inaccurate for contest work and even the most complicated clockwork devices aren't always to be depended upon. The ignition timer adds another link to the already too complicated ignition system—in many cases timers supposedly not connected have ruined flights in duration events by cutting the motor. Also the timer adds weight, often must be placed in the air stream, is easily broken and last but not least, costs a good deal of money.

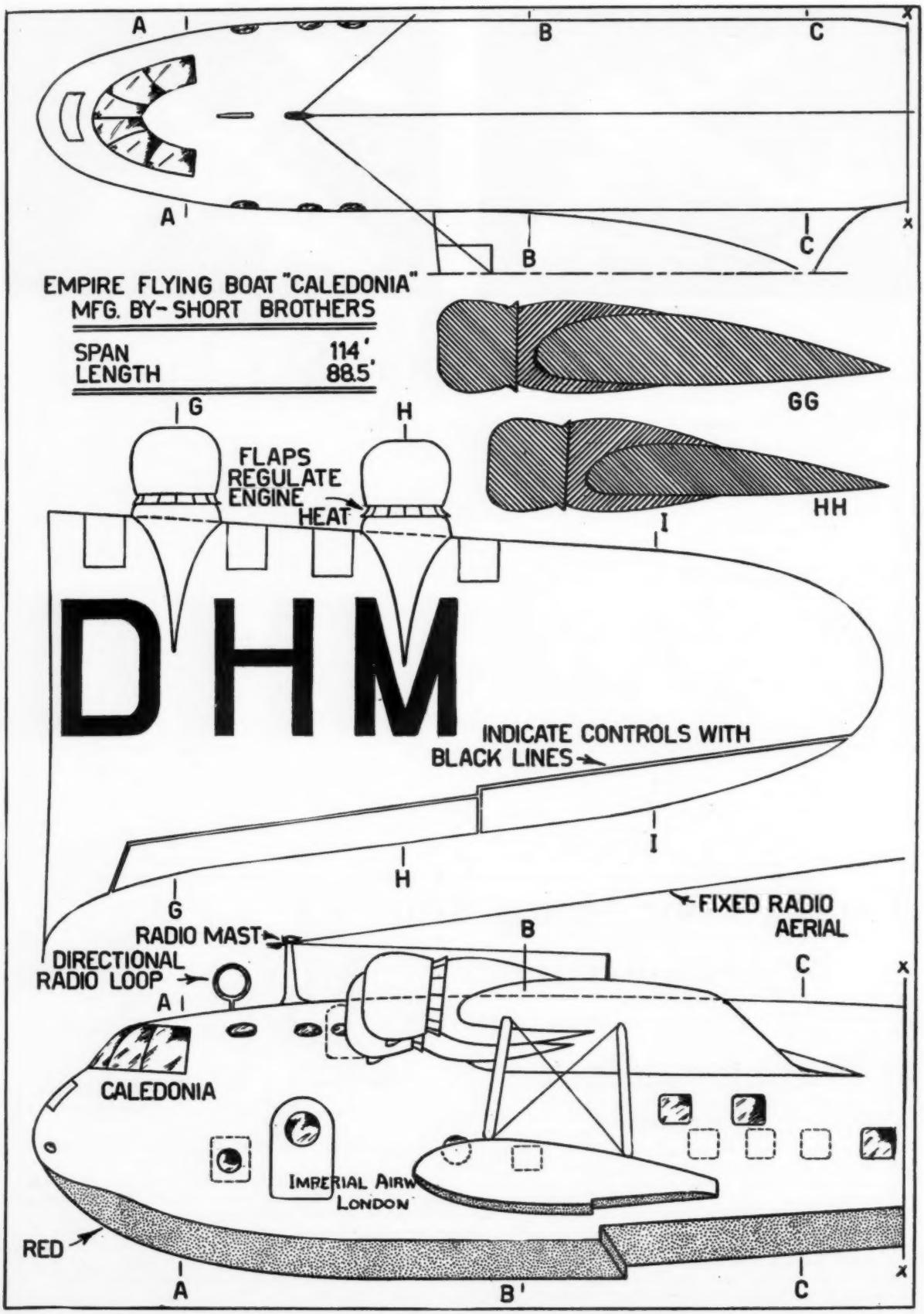


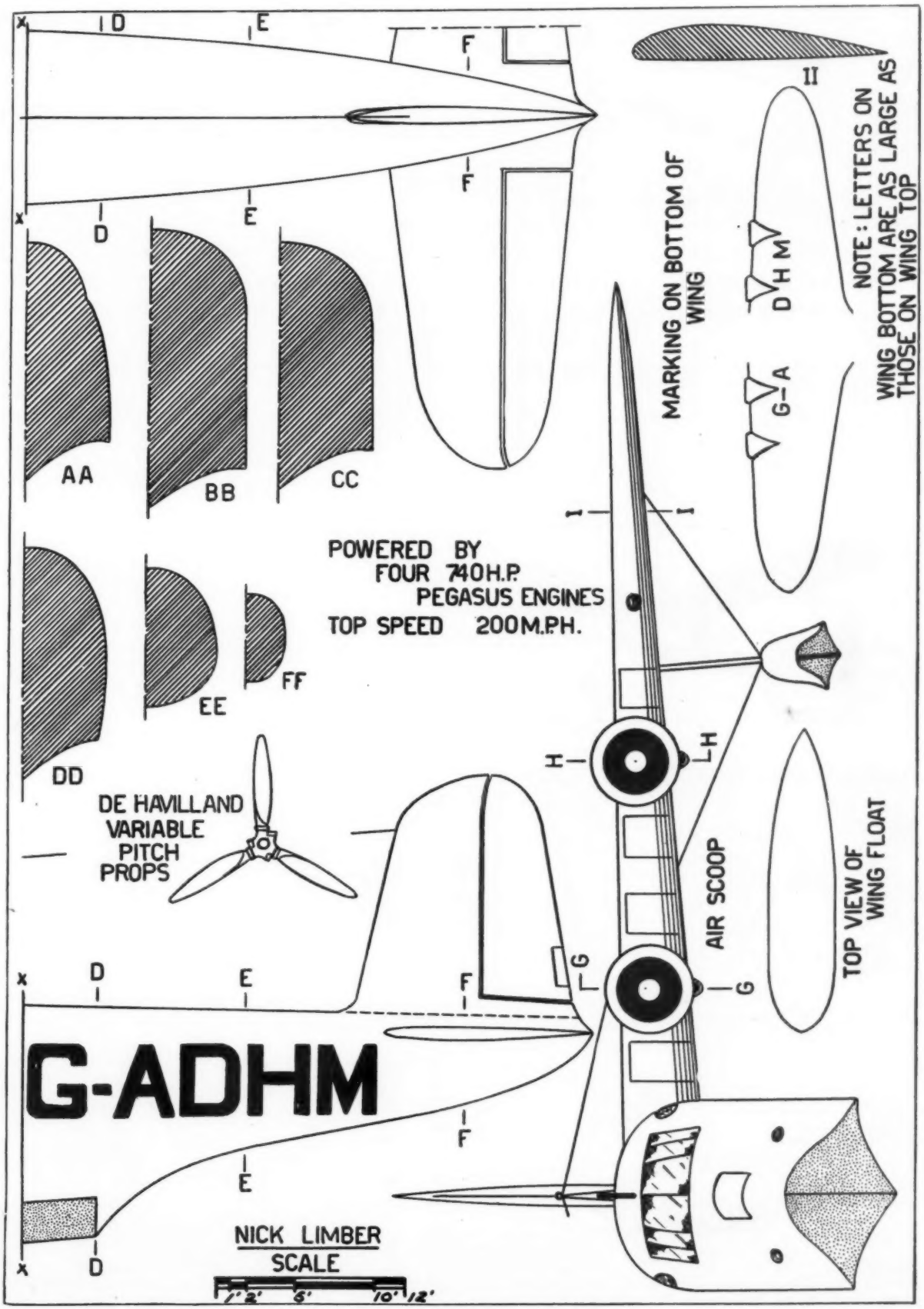
Suction feed system

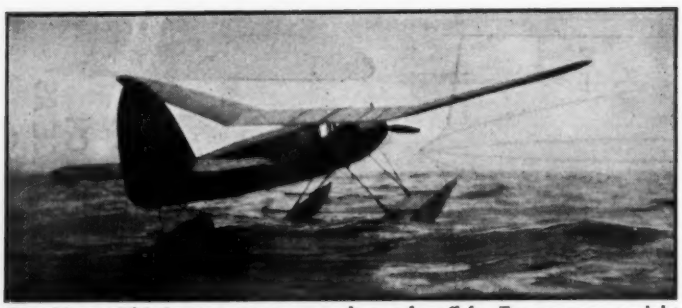
Gravity feed system

Nevertheless, limited motor run flights are here to stay for both testing and contest work so let's take a look at the only other possibility—limiting the amount of fuel until the desired length of motor run is obtained. On the surface there seems to be plenty of obstacles. With such a small amount of gas the motor puffs and coughs, not delivering nearly the high power desired for such an event. Also,

(Continued on page 38)


A
B
C
X
A
B
C
X
EMPIRE FLYING BOAT "CALEDONIA"
MFG. BY- SHORT BROTHERS
SPAN 114'
LENGTH 88.5'
GG
HH
G
H
I
FLAPS
REGULATE
ENGINE
HEAT
DHM
INDICATE CONTROLS WITH
BLACK LINES
FIXED RADIO
AERIAL
RADIO MAST
DIRECTIONAL
RADIO LOOP
CALEDONIA
IMPERIAL AIRW
LONDON
RED
B'


G-ADHM
POWERED BY
FOUR 740H.P.
PEGASUS ENGINES
TOP SPEED 200M.P.H.
DE HAVILLAND
VARIABLE
PITCH
PROPS
MARKING ON BOTTOM OF WING
NOTE: LETTERS ON WING BOTTOM ARE AS LARGE AS THOSE ON WING TOP
AIR SCOOP
TOP VIEW OF WING FLOAT
NICK LIMBER
SCALE
AA
BB
CC
DD
EE
FF



Pict. No. 1. This is not a transport ready to take off for Europe as you might suppose but a hydro Red Zephyr built by John Ross.

"Gas Lines"

What Gas Model Builders in All Parts of the World Are Doing to Increase the Knowledge of Aviation

The I.G.M.A.A. Pin

The I.G.M.A.A. Forms the Nucleus of the N.A.A. Gas Model Division. I.G.M.A.A. Leaders at Special Meeting Vote to Join N.A.A. In Order to Strengthen Their Front Against a Gas Model Ban

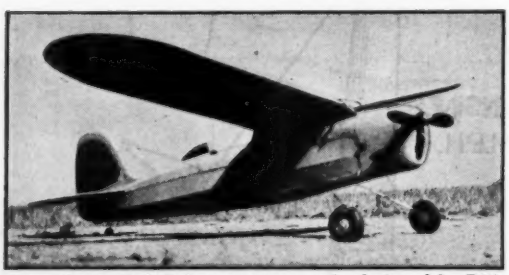
WE WONDER how many gas model builders have listened to the "Cavalcade of America" on the radio. This very interesting program is put on by the DuPont Corporation. The subject usually is some romantic but difficult struggle by an inventor who has created a work of great value to society.

On this basis we believe that the gas model builders of America are eligible to have their story told on this program. There is no more romantic story and more useful development than the progress made with gas model planes. The youth of America has put over this most educational activity. Literally hundreds of thousands of dollars have been spent in making America air-minded.

Today gas models are accomplishing this job in a more efficient manner at about one-hundredth the cost. It is educating young men in every phase of aviation. It is occupying their minds with something which stimulates initiative and original thought. It turns their energy into useful channels, whereas an intelligent brain unoccupied by serious occupations often follows paths which are destructive.

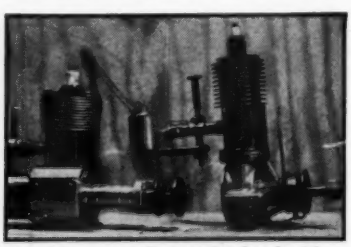
No worth-while development ever took place without a struggle. This is true in regard to gas models. Every fan by this time probably knows of the propaganda that has been spread about gas models. They probably know that two states have placed a ban on the flying of gas models because of the urging of self-appointed benefactors, so-called. The question of banning gas models has arisen in a number of other states. In fact there is a constant danger of having the "peeve" of some negative thinking person spring into flame, and cause trouble for gas model builders. Not that gas models are more dangerous than any other form of activity, but there are a number of persons looking for an excuse to cause trouble. This is the situation as it stands at the present time.

The I.G.M.A.A. has recognized this and has felt that some further organization on a national basis, which would include the good will and support of every big man in aviation, should be undertaken. In a search for such a plan, the first thought was the National Aeronautic Association. This organization is nation-wide. It is sponsored by every prominent man in aviation and is non-commercial. On several occasions the I.G.M.A.A. has been accused of being a commercial organization, and therefore not in the proper position to regulate gas model flying. This cannot be said of the N.A.A.



Pict. No. 2. Bob Baker's sleek gas job, designed by Bill Atwood, a Pacific coast expert.

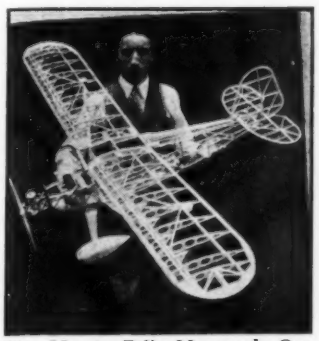
Pict. No. 4. A slick cabin gas job with cantilever landing gear, by Frank Jeffers. It's very well designed.



Pict. No. 12. A Brown Jr. fitted with a float carburetor and a home-made job by F. Schlumpp.

Pict. No. 5. Walter Staff and his Buccaneer on Great Salt Lake flats.

Pict. No. 6. Geo. McLaughlin pursues his Monocoupe "90".



Pict. No. 7. Felix Montes de Oca of Mexico City and his scale Rearwin Speedster.

Pict. No. 8. A group of fans who are putting Florida on the gas model flying map with help of Charles Faraldo.

The matter was taken up with Mr. William Enyart, N.A.A. Secretary, who was highly pleased with the idea. Thereupon he worked up a very elaborate plan of organization which would meet the approval not only of all gas model builders, but all state officials and others interested in the safety element of this pastime. It is a program in which gas model activity can be carried on successfully throughout the entire country without the danger of a ban being imposed, provided all gas model builders live up to the proposed plan and rules governing the flying of planes and behavior of builders.

Circumstances have come to a climax in respect to whether or not gas models would be flown. It is almost an absolute necessity that every gas model builder join this organization for his own protection if he wishes to continue gas model flying.

Now comes the important point. The I.G.M.A.A. has been selected as the organization which will form the nucleus of the new National Aeronautic Association Gas Model Division. This is an honor, indeed. All members who join the new N.A.A. Gas Model Division will receive a certificate which designates them as a pioneer member of the organization and one who has pioneered the art throughout the country. The I.G.M.A.A. pin will be the badge of such pioneer members and will identify them from others who join the N.A.A. gas division after January 1st, 1938. All I.G.M.A.A. members will be issued new membership cards by the Gas Model Division of the N.A.A. They also will be licensed and each ship will be registered. It will be required that they sign a pledge which will govern their flying of models. This is to avert any criticism from trouble makers and to make certain that state and municipal governments will accept the proposed program. Members will receive a bulletin regularly telling of all gas model activities of the Association. Leaders in gas model building will be selected to sit upon a governing board in the Academy of Model Aeronautics. The model builders themselves will govern this activity. An outline of the plan will be found under the N.A.A. section in this issue of the magazine.

The present organization of the I.G.M.A.A. will remain intact; it will merely be transferred to the National Aeronautic Association. Units, with their leaders and members, will remain the same. The only thing that will be changed will be the governing body and membership cards, etc. The rules as they are at present will be used except when they are modified by the gas model governing board of the Academy of Model Aeronautics.

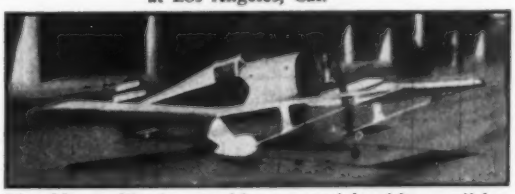
Every member who joins the N.A.A. will be required to pay $1 a year for the many privileges and advantages it will present. In fact, you might say that this fee is being paid in order to help defray expenses of organization that will keep gas model building and flying "on the map."

Every I.G.M.A.A. member should get behind this great movement and put his shoulder to the wheel so that its success will be assured. His response in the fight against the ban on gas models has not been forgotten, and we are certain that this second step in the battle will be carried through with as much energy as other measures that have been taken. Let us have every I.G.M.A.A. member join the N. A. A. immediately. Of course those who do not join will be ineligible as competitors in all contests sponsored by the N.A.A. and will not receive the protection assured by membership in this organization.

In order to join the organization, get in touch with your unit leader, or if you are an individual member, write immediately to Mr. William Enyart, Model Plane Division, National Aeronautic Association, Du-Pont Circle, Washington, D.C. Full information concerning how to join and the

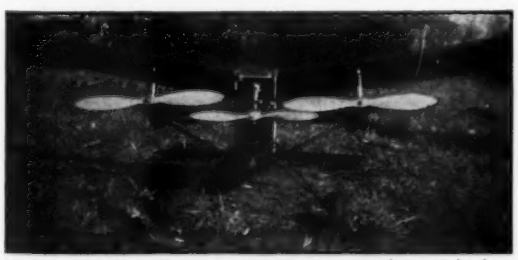
(Continued on page 59)

Pict. No. 9. Fred Hardy, right, and Irwin Ohlsson who won first and second respectively in the first annual I.T.I. contest at Los Angeles, Cal.

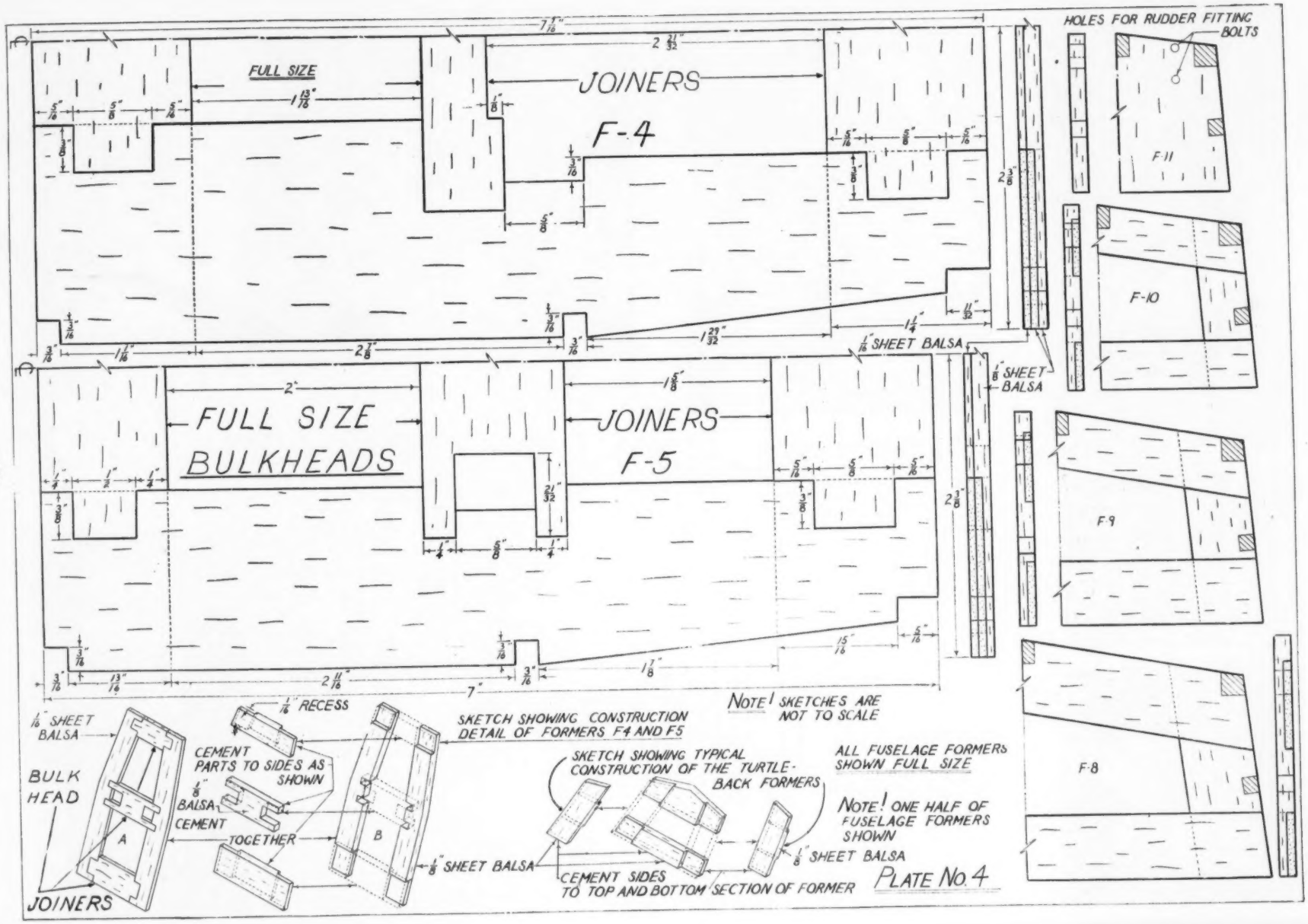


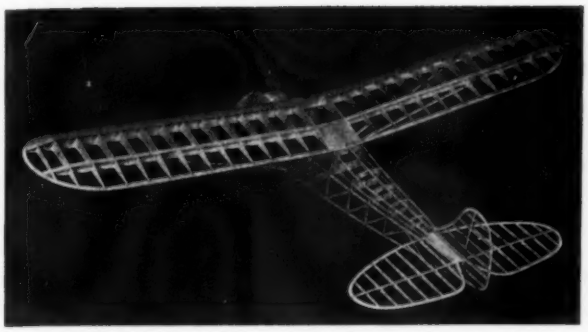
Pict. No. 3. Here's something; a gas job with no tail but with a front elevator, built by W. F. White, Unit No. 19.

Pict. No. 10. Hal Atkins twirls the prop of his 36 inch job just before a flight. It takes off after a 9 inch run.

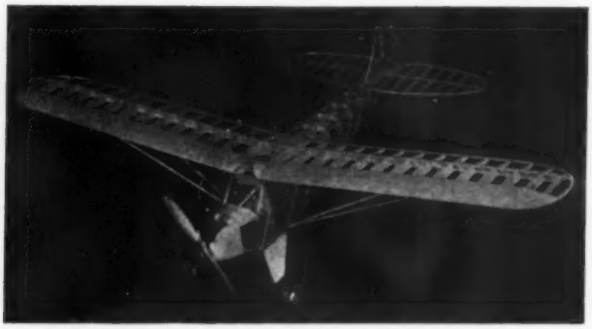


Pict. No. 11. Look at this; a three motored gas job that flies, by Harold Stofer. He also has a ship with twin motors.


FULL SIZE
JOINERS
F-4
HOLES FOR RUDDER FITTING BOLTS
F-11
F-10
1/16" SHEET BALSA
1/8" SHEET BALSA
FULL SIZE BULKHEADS
JOINERS
F-5
F-9
F-8
NOTE! SKETCHES ARE NOT TO SCALE
ALL FUSELAGE FORMERS SHOWN FULL SIZE
NOTE! ONE HALF OF FUSELAGE FORMERS SHOWN
1/16" SHEET BALSA
BULK HEAD
JOINERS
A
B
1/16" RECESS
CEMENT PARTS TO SIDES AS SHOWN
1/8" BALSA
CEMENT TOGETHER
1/8" SHEET BALSA
SKETCH SHOWING CONSTRUCTION DETAIL OF FORMERS F4 AND F5
SKETCH SHOWING TYPICAL CONSTRUCTION OF THE TURTLE-BACK FORMERS
1/8" SHEET BALSA
CEMENT SIDES TO TOP AND BOTTOM SECTION OF FORMER
PLATE No. 4



The uncovered frame discloses sturdy wing spars that won't snap.



It is sturdily braced to take power unit weights.

Build and Fly This Miniature "Cub"

Here Is Complete Data That Will Enable You to Build One of the Finest Scale Gas Models That Ever Flew—A Fine Contest Model—Climbs Fast, Glides Flat and Is Sturdy

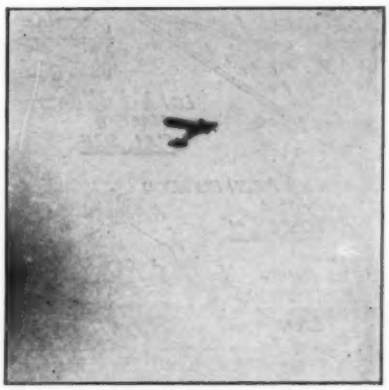
By JESSE DAVIDSON

"YOU can't have your cake and eat it," they told me, "so don't expect super performance from a scale gas job."

Well, I pondered, how much could I really expect of a scale ship dotted with various exposed parts causing parasitic resistance and induced drag? A casual telephone conversation with Mr. Grant on this subject left me assured that a well designed scale job, but definitely well designed, using the right airfoil section would do the trick quite nicely. "Climb, stability and good gliding, that's what you want to get. Come on up and we'll talk it over."

Recently, Mr. Grant and I stood by and helplessly watched our Taylor Cub gas job fly out of sight at an altitude of 1800 feet after a two minute motor run. So completely did the Cub lose itself somewhere among the Green Mountains of Vermont that hopes for its return have been virtually abandoned. This performance figure sounds incredible, doesn't it? But that's exactly what happened. The proof was in the flying.

Let me tell you more about this top notch gas job. You see, your editor is one of those fellows who gets a good idea occasionally. He had one for a gas-powered scale job of some popular light sport ship. He also had lying around a Baby Cyclone of early vintage, and an idea for an airfoil section which since has become his pet. As for me, I found myself with a reasonable amount of spare time during the evenings. Now, here was the opportunity to build my first gas buggy, dispel if possible, some bugaboos about scale jobs, prove a couple of theories and, come to think of it, have my cake and eat it too. But the appetite was purely spiritual.



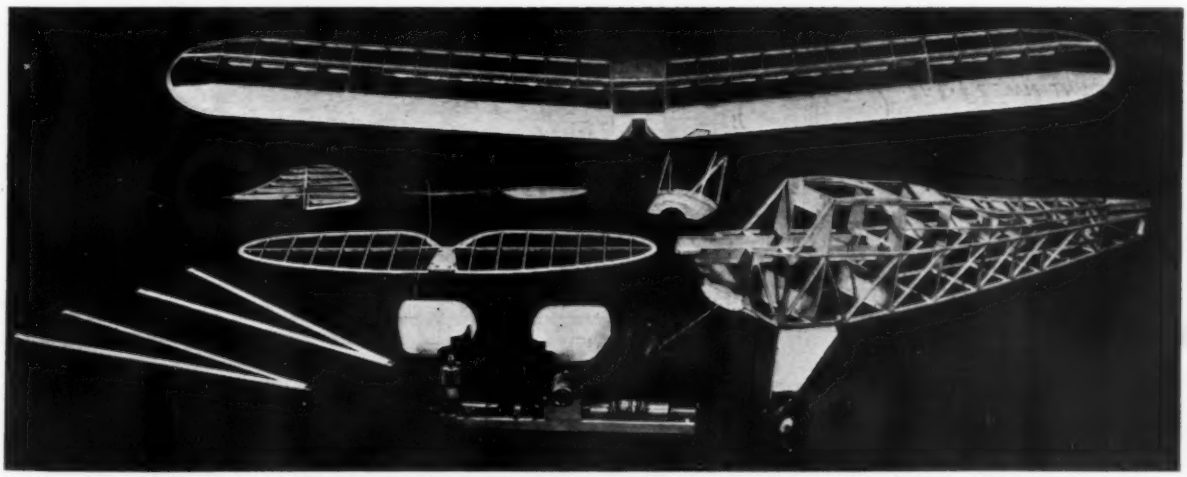
The little ship climbing steadily to 1500 ft. on a 2 minute engine run.

The ensuing eight months saw the Cub take shape from a mass of wood, cloth and glue into a husky six-footer with framework as solid as the United Front.

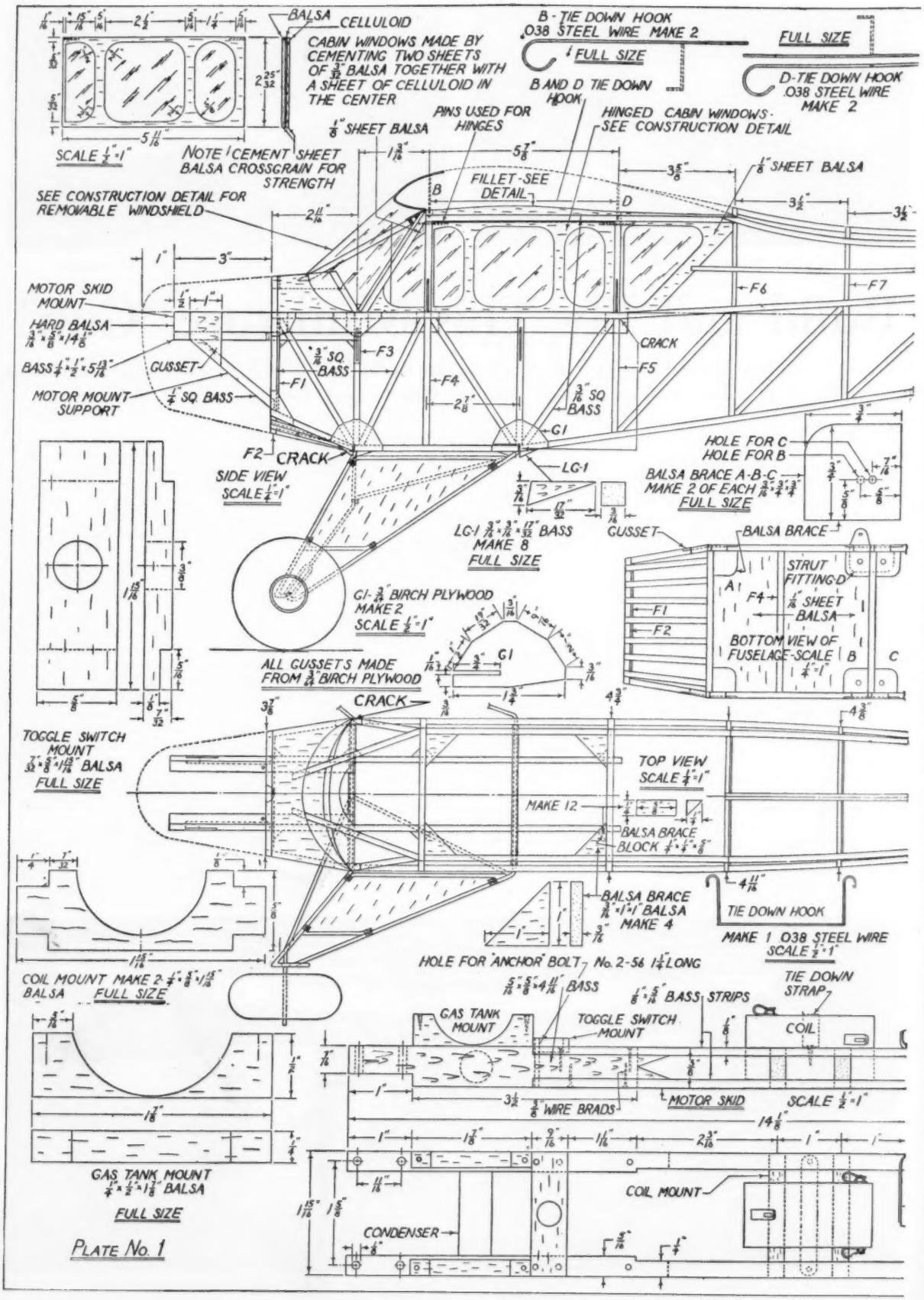
On September 3rd, 1937, the ship was ready for its initial test flight. Successful gliding tests over tall weeds were indicative of a fine performer. Its gliding angle was estimated to be approximately fifteen to one. Short R.O.G. power flights confirmed our beliefs more than ever.

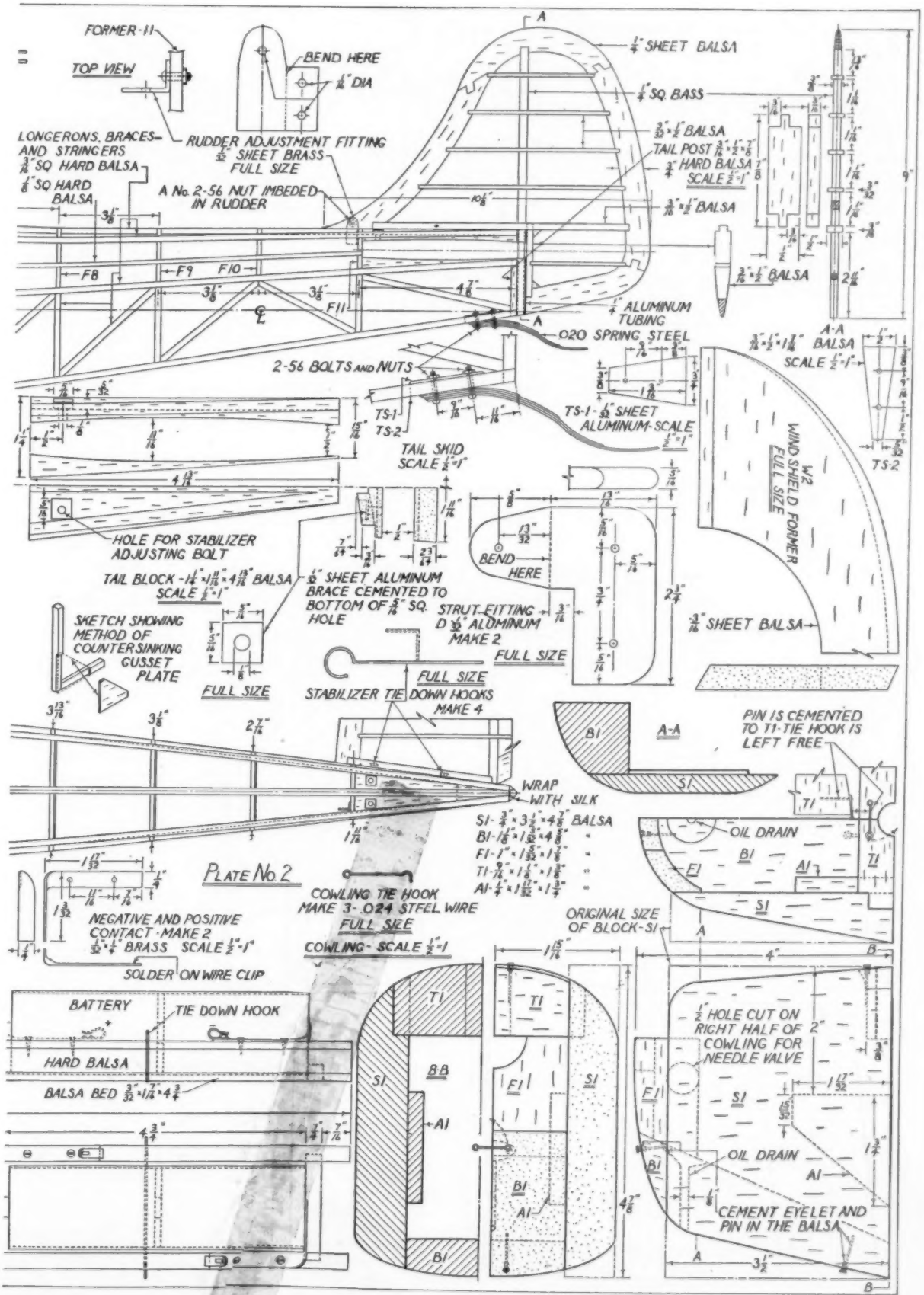
We finally adjourned to a nearby field where Mr. Grant did the test piloting as a matter of routine while I was content to play the part of chief engine wiper and general grease monkey. Since the ship hadn't been equipped with a timer, Mr. Grant decided to restrict the test hops by attaching a 40-foot length of strong cord to the tail skid and thus guiding it from

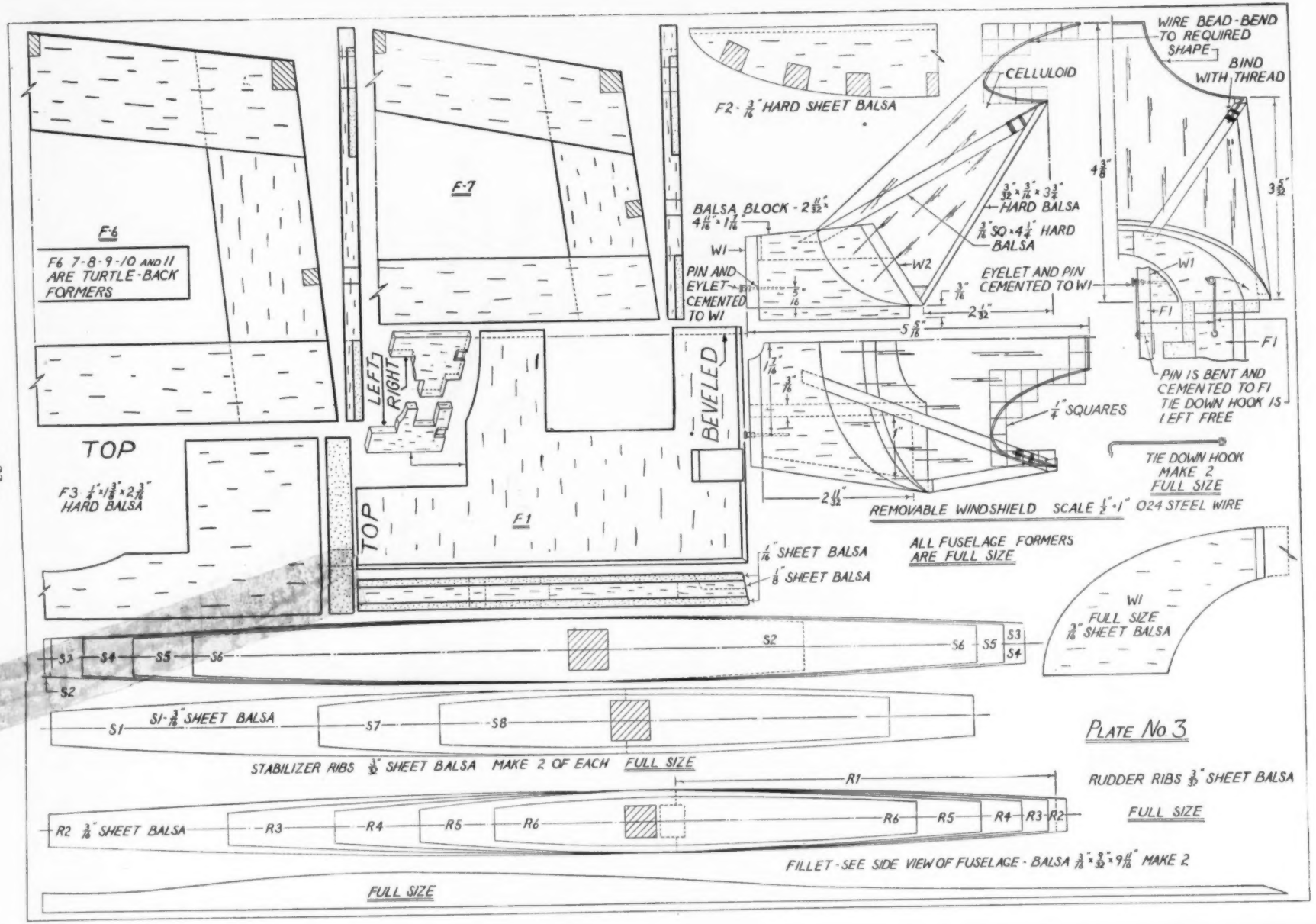
(Continued on page 52)



The ship is built in units with removable engine mount which makes assembly and repairs a simple matter.


BALSA
CELLULOID
CABIN WINDOWS MADE BY CEMENTING TWO SHEETS OF 3/32" BALSA TOGETHER WITH A SHEET OF CELLULOID IN THE CENTER
SCALE 1/2"=1"
NOTE! CEMENT SHEET BALSA CROSSGRAIN FOR STRENGTH
B - TIE DOWN HOOK .038 STEEL WIRE MAKE 2
FULL SIZE
B AND D TIE DOWN HOOK
D-TIE DOWN HOOK .038 STEEL WIRE MAKE 2
1/8" SHEET BALSA
PINS USED FOR HINGES
HINGED CABIN WINDOWS - SEE CONSTRUCTION DETAIL
FILLET - SEE DETAIL
SEE CONSTRUCTION DETAIL FOR REMOVABLE WINDSHIELD
MOTOR SKID MOUNT
HARD BALSA 3/16"x5/8"x14 1/8"
BASS 1/4"x1/2"x5 13/16"
GUSSET
MOTOR MOUNT SUPPORT
1/4" SQ BASS
3/16" SQ BASS
F1
F2
F3
F4
F5
F6
F7
CRACK
G1
LG-1
SIDE VIEW SCALE 1/2"=1"
HOLE FOR C
HOLE FOR B
BALSA BRACE A-B-C MAKE 2 OF EACH 3/16"x3/4"x3/4"
FULL SIZE
LG-1 3/16"x3/16"x17/32" BASS MAKE 8
FULL SIZE
GUSSET
BALSA BRACE
STRUT FITTING-D
1/16" SHEET BALSA
BOTTOM VIEW OF FUSELAGE-SCALE 1/4"=1"
G1-3/64" BIRCH PLYWOOD MAKE 2
SCALE 1/2"=1"
ALL GUSSETS MADE FROM 3/64" BIRCH PLYWOOD
TOGGLE SWITCH MOUNT 1/32"x5/8"x1 13/16" BALSA
FULL SIZE
TOP VIEW SCALE 1/4"=1"
MAKE 12
BALSA BRACE BLOCK 1/4"x1/4"x5/8"
BALSA BRACE 3/16"x1"x1" BALSA MAKE 4
TIE DOWN HOOK
MAKE 1 .038 STEEL WIRE SCALE 1/2"=1"
HOLE FOR "ANCHOR" BOLT No. 2-56 1 1/4" LONG
COIL MOUNT MAKE 2 1/4"x3/8"x1 15/16" BALSA FULL SIZE
5/16"x5/8"x4 11/16" BASS
1/8"x5/8" BASS STRIPS
TIE DOWN STRAP
GAS TANK MOUNT
TOGGLE SWITCH MOUNT
COIL
3/8" WIRE BRADS
MOTOR SKID
SCALE 1/2"=1"
14 1/8"
COIL MOUNT
CONDENSER
GAS TANK MOUNT 1/4"x1/2"x1 7/8" BALSA
FULL SIZE
PLATE No. 1


FORMER-11
TOP VIEW
BEND HERE
1/16" DIA
RUDDER ADJUSTMENT FITTING
1/32" SHEET BRASS
FULL SIZE
LONGERONS, BRACES AND STRINGERS
3/16" SQ HARD BALSA
1/8" SQ HARD BALSA
A No. 2-56 NUT IMBEDED IN RUDDER
1/4" SHEET BALSA
1/4" SQ. BASS
3/32" x 1/2" BALSA
TAIL POST 3/16" x 1/2" x 7/8"
3/4" HARD BALSA
SCALE 1/2"=1"
3/16" x 1/2" BALSA
1/4" ALUMINUM TUBING
.020 SPRING STEEL
2-56 BOLTS AND NUTS
TS-1
TS-2
TAIL SKID
SCALE 1/2"=1"
TS-1-1/32" SHEET ALUMINUM-SCALE 1/2"=1"
A-A
3/16" x 1/2" x 1/16" BALSA
SCALE 1/2"=1"
W2 WIND SHIELD FORMER
FULL SIZE
HOLE FOR STABILIZER ADJUSTING BOLT
TAIL BLOCK-1/4" x 1 11/16" x 4 13/16" BALSA
SCALE 1/2"=1"
1/16" SHEET ALUMINUM BRACE CEMENTED TO BOTTOM OF 5/16" SQ. HOLE
BEND HERE
STRUT FITTING D 1/32" ALUMINUM MAKE 2
FULL SIZE
3/16" SHEET BALSA
SKETCH SHOWING METHOD OF COUNTERSINKING GUSSET PLATE
FULL SIZE
STABILIZER TIE DOWN HOOKS MAKE 4
FULL SIZE
B1
A-A
S1
PIN IS CEMENTED TO T1-TIE HOOK IS LEFT FREE
T1
WRAP WITH SILK
S1- 3/4" x 3 1/2" x 4 7/8" BALSA
B1- 1/8" x 1 3/8" x 4 7/8" "
F1- 1/16" x 1 3/8" x 1 7/8" "
T1- 9/16" x 1 1/8" x 1 3/8" "
A1- 1/4" x 1 17/32" x 1/4" "
OIL DRAIN
B1
A1
T1
F1
S1
PLATE No. 2
NEGATIVE AND POSITIVE CONTACT-MAKE 2
1/32" x 1/4" BRASS SCALE 1"=1"
SOLDER ON WIRE CLIP
COWLING TIE HOOK
MAKE 3-.024 STEEL WIRE
FULL SIZE
COWLING-SCALE 1/2"=1"
ORIGINAL SIZE OF BLOCK-S1
1/2" HOLE CUT ON RIGHT HALF OF 2" COWLING FOR NEEDLE VALVE
OIL DRAIN
CEMENT EYELET AND PIN IN THE BALSA
BATTERY
TIE DOWN HOOK
HARD BALSA
BALSA BED 3/32" x 1 7/16" x 4 3/4"
B-B
A1
B1
S1
T1
F1


F-6
F6 7-8-9-10 AND 11 ARE TURTLE-BACK FORMERS
F-7
LEFT
RIGHT
BEVELED
TOP
F3 1/4" x 1 3/8" x 2 3/16" HARD BALSA
TOP
F1
F2 - 3/16" HARD SHEET BALSA
CELLULOID
WIRE BEAD - BEND TO REQUIRED SHAPE
BIND WITH THREAD
4 3/8"
3 5/32"
BALSA BLOCK - 2 11/32" x 4 11/16" x 1 7/16"
3/32" x 3/16" x 3 3/4" HARD BALSA
3/16" SQ x 4 1/4" HARD BALSA
W1
W2
PIN AND EYLET CEMENTED TO W1
1/16"
3/16"
EYELET AND PIN CEMENTED TO W1
2 1/32"
5 5/16"
F1
F1
PIN IS BENT AND CEMENTED TO F1 TIE DOWN HOOK IS LEFT FREE
1 7/16"
3/16"
1/4" SQUARES
1"
TIE DOWN HOOK MAKE 2 FULL SIZE
2 11/32"
REMOVABLE WINDSHIELD SCALE 1/2" - 1" 024 STEEL WIRE
1/16" SHEET BALSA
1/8" SHEET BALSA
ALL FUSELAGE FORMERS ARE FULL SIZE
W1 FULL SIZE 1/16" SHEET BALSA
S3
S4
S5
S6
S2
S6
S5
S3
S4
S2
S1
S1 - 3/16" SHEET BALSA
S7
S8
STABILIZER RIBS 3/32" SHEET BALSA MAKE 2 OF EACH FULL SIZE
PLATE No 3
R1
RUDDER RIBS 3/32" SHEET BALSA
R2 3/16" SHEET BALSA
R3
R4
R5
R6
R6
R5
R4
R3
R2
FULL SIZE
FILLET - SEE SIDE VIEW OF FUSELAGE - BALSA 3/16" x 3/32" x 9 11/16" MAKE 2
FULL SIZE

By WILLIS L. NYE

Your Career in the Aircraft Factory

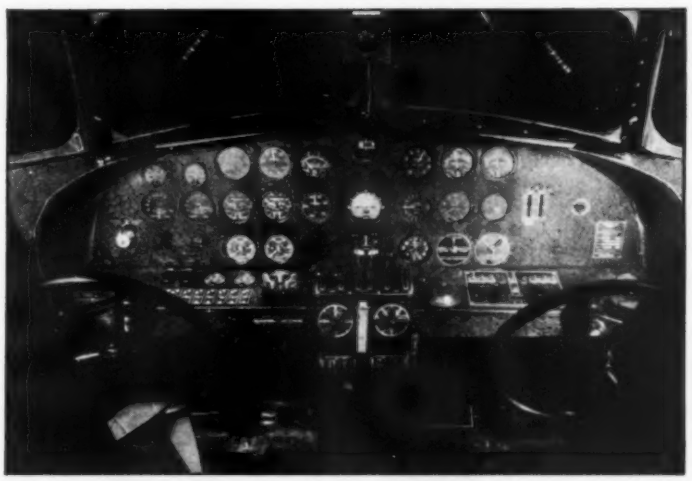
How the Production Department of the Business Provides Broad Opportunities for Ambitious Men Who Desire a Career in Aviation

SHOP work offers to the young worker of this modern age an average remunerative income. The average wage of the shop worker compares favorably with the same status of position of the administrative or office employee. The whole aspect of shop work in the recent industrialization of the United States has changed. Shop professions require highly skilled men in the divisions of labor. Modern production of any kind is based upon the use of skilled and semi-skilled labor. It may be added that semi-skilled labor is required to have a very clear perception and experience of its allotted task. The day is fast approaching when an individual who is entirely unskilled will stand absolutely no chance of employment in our basic production industries of which airplane manufacturing ranks high on the list.

Obviously there exists no strata where the "unskilled" person can find a "toehold" in modern industry. It is granted that unskilled individuals can secure odd jobs here and there, but any definite position which offers an average worker's income is not open to their acceptance. Naturally it follows that training in some specific field is of predominant importance to earning a living. This training can be procured in the high school, the professional trade school and by serving as an apprentice in a practical and workmanlike manner.

It is a mistaken idea to assume that the so-called administrative or "white collar" jobs offer greater opportunities by comparison than factory positions. In large organizations there are many sub-executive positions which can be attained in the production end of the concern, more so than in the administrative branch of the business activities. Sub-departmental heads or "key men" are the vital cogs in any production program. These positions are well paid and carry certain privileges comparable to administrative positions. When the particular antipathy which exists between the two classes of workers is dismissed, a better understanding of the entire aspects of the business is possible by the worker. Certain individuals harbor a false idea that if a person labors in the factory that the individual's social position is somewhat lowered. Nothing could be farther from the truth. The same could equally apply to the office worker. In all classes of wage earners, the average wage per week in the United States for the year 1936 was slightly in excess of 28 dollars. This substantiates the statement, that aside from the extra physical expenditure of energy, administrative work does not offer anything unusual over factory production work. Perhaps the advantage of the office position may be classed into a condition of less discipline and the advantages of a monthly salary, in contrast to an hourly basis.

Production workers who are educated and trained have a decided advantage over the so-called "practical" man. It is no lowering of one's social dignity to be trained to become a skilled shop craftsman. It is the other way around because mechanical skill is equally as necessary as administrative or mental ability in modern business. The cross section of the American working class of today shows a higher degree of intelligence and skill than of 30 years ago. The trend of the times shows that in order to be useful to industry, the worker must possess a high degree of intelligence. Many concerns are realizing this and are expending large sums in vocational training of their unskilled or semi-skilled help.



The instrument board in the cockpit of the Lockheed 12 transport. Such an installation requires the most expert and scientific workmanship.

The mental attitude of the intelligently trained worker is such that after the initial experience is gained, ample opportunity can be found to employ the individual's inherent skill and experience in attaining a key position or sub-departmental capacity of superintending. The more enlightened concerns are taking steps to see that a definite program of advancement can be extended to the worker who exhibits interest in improving himself. Many college graduates make the mistake of overlooking the production end of business in preference to the administrative. In the administrative branch, competition is keen for any situation, whereas in the production branch, ample opportunity is always available to college men. A college graduate who is skillful with his hands in a short time can apply his superior knowledge and training in theory to good benefit to his employer. Now if the wages in either branch are comparable, then the odds lie in the production end of the business for a more rapid and stabilized advancement.

The American aircraft industry derives large orders from foreign airlines. In one large factory which purveys equipment to all of the leading airlines of the world, it has been the practice to train the better class of skilled mechanics as field representatives for the servicing and operation of equipment when the airplanes go into service. Now this work requires an individual with a good educational background, plus mechanical experience and some knowledge of the conduct of business. These jobs offer travel with full pay and expenses and a chance to acquire a world-wide reputation for proficiency. Employment such as this is by far more advantageous than an equivalent administrative position in the organization because it carries many privileges.

Take for instance, the field of specialized installation of component parts such as the instruments, the booster pumps, radio equipment, engines and other accessories. This is comparatively clean work. Each one of these branches of airplane construction requires a special knowledge plus mechanical and theoretical training. Instrument installation is very interesting work. It involves precision work and testing. It is indeed comparable to watchmaking. Radio bonding, shielding and testing is the work which requires an expert in electrical theory. Engines and fuels offer an equally interesting field. The rigging and layout of controls extend similar possibilities.

Tool and die design is another branch of shop work which requires a mechanical engineering training plus production experience. It is a very prolific and interesting field to work in because a great percentage of airplane work is done on a production basis by these methods. The inspection and testing of materials is another source of interesting work. It compares favorably with physical laboratory work and serves as a starting point for design and detail

(Continued on page 56)

National Aeronautic Association Junior Membership News

Prepared by National Aeronautic Association, Dupont Circle, Washington, D. C.

BIG NEWS TO ALL GAS MODEL BUILDERS

You are all aware of the charges that have been made against gas models and model flyers in recent months. You know that at least two states have acted to ban gas model flying within their boundaries due to lack of confidence in this activity. It has called for strong counteraction and the N.A.A. and the International Gas Model Airplane Association have not been idle.

Thus we are pleased to announce action of the Unit leaders of the I.G.M.A.A. whereby this fine organization is merged with the N.A.A. to form a new N.A.A. Gas Model Division. This division will offer a new national and international program for gas models which we feel will give gas modelers the opportunity to end once and for all criticisms against their activity. Since I.G.M.A.A. leaders will become directors of this new division under the merger plan, administration of this program by gas model experts is assured.

The new Gas Model Division was made possible by the fine pioneering efforts of the I.G.M.A.A. members and Mr. Charles H. Grant, National Director for the I.G.M.A.A.

The actual working program of the Gas Model Division will be related in the following paragraphs.

Licenses will be issued gas model flyers by the new organization. Each licensee will be pledged to strict adherence to certain operating rules in the interests of safety. These rules are not anything really new but merely what the ordinary sensible gas model flyer does to protect both himself and his model. They include limitation either of time of engine run to 40 seconds or of fuel to not more than 1/16 ounce to each pound of plane weight and the restriction of plane weight to a maximum of 7 pounds. No one under sixteen years of age will be issued a license and no licensee can fly his models from airports where approval for such operation has not been given. Action against violators will take the form of suspension or withdrawal of license thus disbarring them from "official" contests and officially approved flying sites.

In addition to issuing licenses, the directors of the new organization as members of the Gas Model Section of the Academy will decide on rules for the annual National Gas Model Contest and will act to certify national and international gas model records.

At the meeting of the I.G.M.A.A. directors and members, it was decided that the annual membership and license fee would be $1.00. These fees help to cover a portion of the cost of issuance of the flying license, registration of each model, lapel pin, and the various individual and club services obtained. They have been held as low as practical for the benefit of all builders and cover only a portion of the total expenses incurred by the N.A.A. in carrying on this work.

Dr. Hugh D. Wilson, contest director, Topeka model chapter. Chairman of Kansas State N.A.A. contest board.

Since the I.G.M.A.A., as mentioned before, will merge directly into the N.A.A., all members of the I.G.M.A.A. who become members under the new Gas Model Division of the N.A.A. before January first will be issued a certificate attesting that he is a gas model "early bird" and a pioneering member of the N.A.A.'s new division to further the cause of model building and to fasten more confidence in and support of gas model operation in all parts of the country. The I.G.M.A.A. pin will be the emblem of the pioneer members.

Another point of interest is that records for gas models will now be recognized internationally as well as nationally through representation of the Gas Model Division on the newly-formed Model Aircraft Commission of the F.A.I.

Here's the approximate form of the pledge that gas model fliers will sign:

Gas model fliers who make the following pledge are eligible for the N.A.A. Gas Model Fliers License.

The Official Gas Model Fliers Pledge:

I make the following pledge as my contribution toward the establishment of a standard for operation of gas models which will fasten greater confidence in and support of gas model operation on the part of airport managers, air transport companies, private and military pilots, state and federal aeronautical services, and the general public.

I swear that I will abide by this pledge at all times and in case I do not and my gas model fliers license is thus revoked, I will deliver this license immediately to an N.A.A. Model Contest Director or re-

Joe Richter and his eight foot gas model that he is remodeling to conform to N.A.A. specifications. It is powered with a Forster Brothers engine.

turn it to N.A.A. headquarters, Dupont Circle, Washington, D.C.

I hereby pledge and agree that:

Each time I fly a gas model I will act to control its flight range either by use of a timer which will restrict the engine run to not more than 40 seconds or by limitation of its gas supply to not more than 1/16 ounce per pound of model weight.

That I will not fly a gas model on or near any airport or heavily populated area unless the take off site has been approved for gas model flying by an N.A.A. Model Contest Director, airport manager, Bureau of Air Commerce Inspector or State Aeronautical Inspector.

I will not build or fly any gas model which exceeds 7 pounds in weight or which has a wing loading not less than ten ounces per square foot or which has not been registered with the N.A.A. or such registration applied for.

I hereby certify that I meet the official age qualifications for gas model fliers (16 years of age or over) and that I will not permit any person less than 16 years of age or any person who is not licensed as a gas model flier to fly gas models owned by me.

The Following are Member Benefits:

Under the new program each licensed gas model flier is automatically enrolled as a member of the new gas model division of the N.A.A. and receives or is eligible for the following:

1. The N.A.A. gas model fliers license with which is combined the membership card signifying membership in the gas model division of the N.A.A. As holder of the N.A.A. gas model fliers license eligibility to fly from "approved" sites.
2. The N.A.A. wing emblem lapel pin.
3. Registration of each gas model airplane owned by the license holder. An official registration label identifying the plane and decalcomonia N.A.A. identification emblems to be placed on each plane.
4. As holder of the N.A.A. gas model fliers license eligibility for entrance in gas model contest sanctioned by the N.A.A. with the right of protest and appeal. Eligibility for award of N.A.A. city-wide Championship Certificates.
5. Upon proper application, official recognition of any state, national or international records established together with an engraved record certificate attesting to such records.
6. Upon proper completion of performance requirements and upon written application, the gas model fliers Rating Certificates of the N.A.A. These rating certificates are issued only to those members who in officially timed flights are able to meet the minimum performance requirements specified for each rating.
7. Upon written request any national record lists, drawings of record breaking aircraft, model rules or listing of sanctioned model contests published by the Association during the year.

Only members may compete in N.A.A. sanctioned contests.

Three point winners of Aurora chapter flown to National contest in T. M. Sloner's plane.

Winners of the contest held at Camp Kearney on October 17th

A Brief Outline of the New National and International Organization for the Gas Model Division is as Follows:

First, there is the F.A.I. International Model Commission made up of representatives from the N.A.A. Academy of Aeronautics, Society of Aeronautical Engineers of Great Britain and model governing organizations in Germany, Italy, France, etc. Under this is the N.A.A. Academy of Model Aeronautics gas model section made up of gas model leaders from all sections, under the chairmanship of Charles H. Grant. These will decide on national contests and awards, national gas model classification and competition rules, national records, gas model flier license and plane registration requirements. Under the Academy is the N.A.A. gas model division headquarters staff made up of stenographers and clerical help under the supervision of N.A.A. Contest Board Secretary. This will handle all clerical work.

N.A.A. member Francis N. Royal of Brisbane, Australia, with his Brown-powered gas model. It has flown for 7 min., 48 1/5 sec.

Under this branch are the State Model Boards, made up of model leaders and model directors in the state, headed by a prominent model leader as state director, chosen from the ranks of model builders. They will promote the organization of statewide contests, approve statewide records, etc. Under this state board will be the National Model Contest Directors who will be chosen from individuals qualified by experience, age, community standing, to act as supervisors of gas model activity. They will direct contests and plan their function.

Under this branch of the organization will be N.A.A. Gas Model Clubs and N.A.A. Metropolitan Model Wing. The N.A.A. clubs are made up of model builders and fliers in towns where a single club is most practical. The Metropolitan Model Wing is made up of contest directors of each club in the metropolitan area. Under the Metropolitan Model Wing will be District N.A.A. Gas Model Clubs which are made up of model builders and fliers located in each district of the metropolitan area.

All gas model clubs will be eligible for charters as a gas model chapter of the N.A.A. There will be a periodic national model aircraft conference at Washington.

N.A.A. Model Chapters are Taking the United States!

Louisiana is not resting on its laurels. As related in the last issue, Louisiana has four fine Chapters. To this number they have added another in New Orleans which will be under the direction of Whalen J. Norman. According to reports from Mr. Norman, plans are going ahead rapidly for the Southern Meet, which is a brain-child of the Glorioso brothers. They are contacting all Contest Directors and clubs in the southern part of the United States and from the looks of things it's going to be a swell affair. In case you are interested and have, not, up to the present time, been contacted regarding this meet, we are sure that Rocco Glorioso, New Iberia, La., will be happy to give you any information. They plan to hold this meet next summer in New Orleans.

You will all be interested to know that the Charlotte group has been issued their Charter and are now a Chapter in good standing. Elsewhere in these pages there is a story of the plans of that club which will give you some idea of what a progressive group they have and what a good addition they are to the N.A.A.

One Chapter that will never lack for

timers is the new one in Hampton, Virginia, where they have eight Senior Advisers. Credit for this active addition to the N.A.A. goes to Edward R. Sharp, Administrative Officer of the National Advisory Committee for Aeronautics. The official name of this Chapter is Hampton Roads Model Association. Philip Pepoon, Hampton, Virginia, Norman Richardson, Hampton, Virginia, Robert Crawford, Philadelphia, Pennsylvania, and Warren Gilman, Langley Field, Virginia are the newly-elected Contest Directors. With all those Senior Advisers, and four of them being Contest Directors, we are expecting great things from down Virginia way.

The Junior N.A.A. is spreading its wings to far places, Cristobal, Canal Zone, being the point of interest. A Model Chapter has been formed there under the direction of Mr. E. Collins. Gee, just think of the thermals they must get down there. A-n-d what's more we have gotten two very promising letters all the way from Australia on forming Chapters!

Charlotte junior chapter of the N.A.A., in their workshop at the Charlotte Airport, going over plans for their radio-controlled sailplane they are going to build.

And now we jump out to the West Coast. The Senior Chapter of Wausau, Wisconsin, through the efforts of Walter Roehl, Secretary, have sponsored the formation of a Model Chapter in that city. This group of boys was highly recommended by the Senior Chapter and we were greatly pleased to have them entered in the annals of the N.A.A. F. E. Bachhuber, Jr., and Walter Roehl will act as advisers for them and with such able assistance, we are sure that they have a fine future.

We have often wondered just what was the trouble down in Florida. They have practically perfect weather all year round, while other groups are faced with such serious problems as four foot snows. Yet, we had only one Chapter in Florida, that being in Jacksonville under the commendable direction of William L. Timpone. And then, just about that time, like a very welcome drop from the blue, came an application for Charter from St. Augustine. And when they start to do something down there, they really do it up brown. H. N. Mangos sent a request for Chapter material, and just ten days after that material was sent out, their Charter was mailed to him and St. Augustine boasted a Chapter in good standing. Nice going, huh? Harry will act as Contest Director, and being a person of such dispatch, we feel sure that there will be plenty more heard from them.

Al Solomon who flew his model for 27 min., 31 sec., at Park District contest, Harlem, Ill.

Now across the map a bit to Tyler, Texas. Before this application was received at N.A.A. headquarters, a fine letter was received from H. J. Bryant of the Tyler Chamber of Commerce saying "These boys are all fine, energetic boys of good moral standing who are interested in furthering the cause of model aviation and sponsoring better contests." With such a build-up as that, from a responsible Tyler citizen, we eagerly awaited receipt of their application. Now they are a full-fledged Chapter and are under the supervision of O. C. Palmer, manager of the Municipal Airport of Tyler, who is a licensed pilot and reported to be one of the best airport managers in the country. Tyler, you have a fine set-up, so let's see what you can do!

A long hop and we land in Richmond, Virginia. Here we have a new Chapter too—and what a Chapter! They have sixty Charter members. We are warning you other fellows right here and now that there is strength in numbers and Richmond is way ahead of many of you at its very beginning. The *Richmond News Leader* is sponsoring this large group with James R. McKeldin and Ralph W. Howe acting as Senior Advisers. James McKeldin is the promotion manager for the *News Leader* and Ralph Howe, one of our own District Vice-Presidents. Just keep an eye on them, and don't say we didn't warn you.

Another Chapter which can boast large numbers is that in Aurora, Illinois. Even with a group of 50 at the present time, the Senior Chapter is starting a membership drive to increase that number. At the end of the membership drive, Russell Perry, their Contest Director, has promised a party for all the Junior members at T. M. Stoner's house. That, by the way, is the favorite place in Aurora for parties. They'll have ping-pong contests and refreshments. Hmmm . . . wish we could be there!

CHARLOTTE JUNIOR CHAPTER OF THE NATIONAL AERONAUTIC ASSOCIATION

By Mrs. Clayton Patterson, Charlotte, North Carolina

The Charlotte boys have been leaders in model aircraft building for some time and with the increased activity in flying fuel-powered models, these boys have become very expert and have held several sanctioned meets under the National Aeronautic Association.

Realizing the advantages of affiliating

(Continued on page 62)

Fill in the coupon below for membership in the N.A.A.

Use this coupon for either junior membership application *or* for requesting NAA Junior Chapter information.

NATIONAL AERONAUTIC ASSOCIATION OF U.S.A.
Dupont Circle, Washington, D.C.

☐ Please send me information on how to form an NAA Junior Chapter and a Chapter charter application form. I enclose a 3c stamp for return postage.
☐ I enclose fifty cents for annual NAA Junior membership dues (use cash, check or money order) and hereby make application for Junior membership in the National Aeronautic Association. (Age limit 21 years).

Name .....
(Please print or type)

Street .....

City ..... State .....

Date of Birth.....
(Month, Day, Year)

Membership application approved*.....

*(If membership application is being made and applicant is under eighteen, have parent sign here.)

Designing Your Gas Model

Chapter No. 5
Article No. 70

How the Flight Force Arrangement for Maximum Stability Can Be Modified So a Variety of Fuselage Shapes May Be Used Without Destroying the Stability of Your Craft

By CHARLES HAMPSON GRANT

AS THE sport of gas model building and flying becomes more popular, it is possible that a larger proportion of model builders will design and build their own ships rather than construct gas models from kits. It is essential, therefore, that they understand the fundamental principles of design—those principles which will insure stability in their craft. Preceding articles on designing your gas model have explained in great detail the salient points which should be considered as well as the procedure which should be followed in laying out the system of forces that act on an airplane when it is in flight. It is vitally important that the force arrangement takes a certain form in order that the highest degree of stability will exist.

In the last article one of the best force arrangements was shown and it was described how an outline of the body should be made in cardboard so that the center of lateral area could be determined readily. We suggest that those who have not read this article go over it carefully in order that the following explanation will have greater significance.

After the outline of the pattern has been established to your satisfaction so that the center of lateral area coincides with the C.L.A. of the diagram, the pattern should be placed in proper position over the drawing and the outline traced. It is quite possible that after this has been done you will see some change which will perhaps improve the looks and general contour of the fuselage. If you change the outline, it is essential that you do not change the center of its lateral area. For instance, if you cut a little away from the top of the fuselage, a compensating amount should be cut away from the bottom so as to keep the C.L.A. in its original position. If you should happen to find that a higher rudder would be more suitable, greater area should be added below the C.L.A. to compensate for the area of the larger or higher rudder above the C.L.A.

If you follow this compensating method accurately and carefully, you can develop various shapes from the original design without disturbing the center of lateral area of the fuselage.

Now suppose we look at Diagram (A), in figure 134. This is the type of fuselage that will most readily lend itself to the setup of forces which have been established as most advantageous. You will notice that the C.L.A. is on a horizontal line with and to the rear of the center of gravity. The parasol wing type of plane insures a large distance between the center of gravity and the center of lift (C.L.). The line of thrust or L.T., is shown in the diagram in the position which was established in the preceding article.

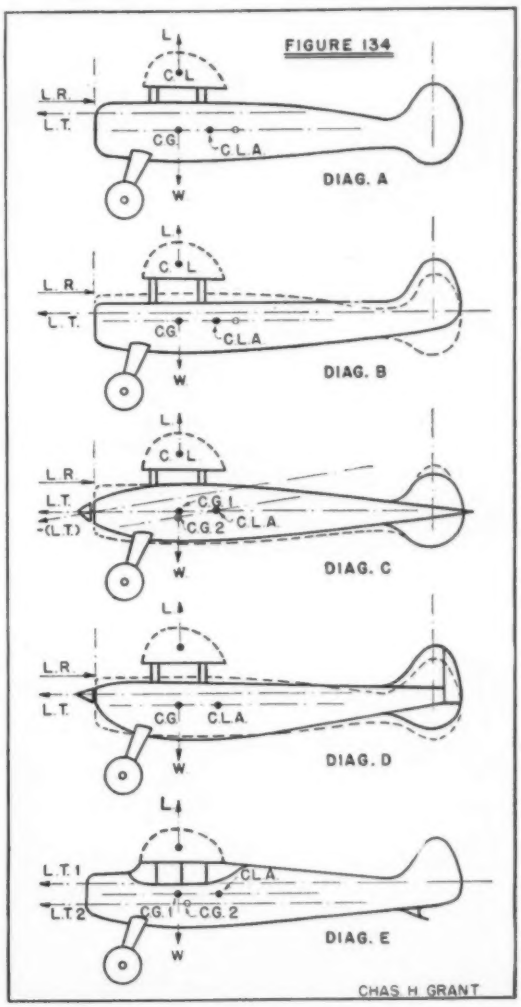
Now let us analyze why the body must assume the shape shown. Apparently the height of the body under the wing is extreme relative to the low part immediately in front of the fin. You might ask "Why?" Continue the top of the body in a horizontal line straight back to the tail as shown in Diagram B. If this is done, area is added to the body above the C.L.A. Therefore, it would be necessary to add more area below the C.L.A. to compensate for it, unless the height of the body under the wing was lowered slightly to compensate for the increase of the height near the tail. Diagram (B) illustrates this condition.

Let us see what we have. With the lowered body under the wing, we are now unable to place the motor high enough so that the line of thrust is in the desired position shown in Diagram (A). In this case the line of thrust would be on a level with the top of the body itself. It would be most inconvenient to mount a motor in such a manner that this condition would exist. The only proper procedure in such a case is to lower the line of thrust to a position as shown in Diagram (B). Thus by the change we have left, the center of gravity and the C.L.A. in the same relative position but the line of thrust is closer to the center of gravity. For this reason the forces set up shown in Diagram (B) will not produce the same degree of stability as the one illustrated in Diagram (A). However, lowering the line of thrust does not affect stability to a very large extent and this change may be tolerated where it is inconvenient or undesirable for some other reason to have a very high body as shown in Diagram (A).

If the wing is raised to a higher position than shown in Diagram (B), the increase in the stability will compensate for the lowering of the line of thrust.

After the final design or outline of the fuselage has been established you may proceed to design the other characteristics of your plane. However, before any definite design is made on the character of the outline of the fuselage, it is advisable that other common forms of fuselages be analyzed in respect to their stability force setup shown in Diagram (A). One of the common fuselage types is a symmetrical streamlined shape which is shown in Diagram (C), in the heavy lines. The dotted lines show the original outline of the fuselage pictured in Diagram (A). From this latter outline of Diagram (C) you can see readily what changes have been required in order to create a streamlined shape. At the nose a little has been cut away from the upper part of the fuselage and a compensating amount from the underside of the nose. However, there has been slightly more cut away from the bottom part than from the upper part. This compensates for the slight additional lateral projected area immediately in front of the fin. The fin itself is practically the same as in Diagram (A). The center of gravity and the C.L.A. are in the same relative position also. The

(Continued on page 51)



Flight force changes due to change of outline.

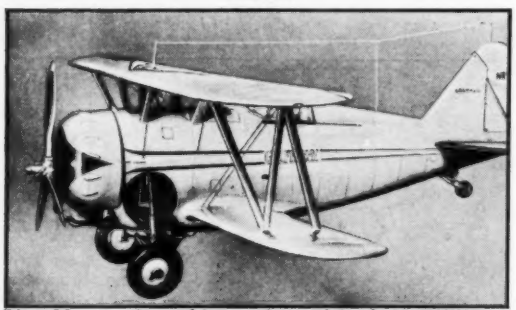
The Lockheed 14 "Sky Zephyr," drawn by H. C. Wood.

AIR WAYS

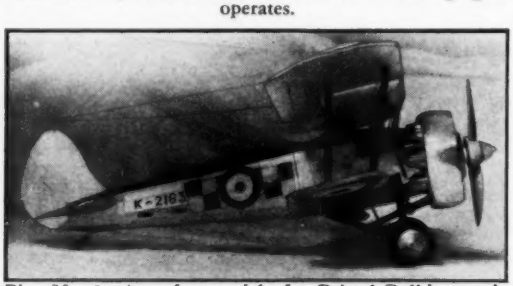
HERE AND THERE

What Readers Are Doing to Increase Their Knowledge of Aviation in All Parts of the World. Tell Others What You Are Doing

Pict. No. 1. This perfect scale model of a Boeing P26-A by Ralph Guernsey has won two first prizes in Cal. state contests.



Pict. No. 2. A working scale model of Al Williams' Gulfhawk by Arthur Hardt. Even the landing gear operates.



Pict. No. 9. A perfect model of a Bristol Bulldog made of paper, wood, metal and pins by Colin Wrigley.

Air Ways Club News

RUBBER power seems to have taken another spurt ahead after the first siege of gas model popularity. This does not mean that gas models are becoming less popular. It does mean that though the number of gas model builders are increasing, a certain number of the older gas model builders are varying their aeronautical diet by returning to experiments with rubber-powered ships as well as gas models.

We have some very interesting contributions from Air Ways members in various parts of the world. Harland C. Wood of Boston Street, Middleton, Mass., builds models but he also excels in drawing airplanes. Many readers will remember that he has contributed a number of excellent headings to Air Ways. Without question the aeronautical artist of the future will be in great demand and will assume a very important role in the industry.

The wash drawing of the Lockheed 14 "Sky Zephyr," which appears at the head of the column this month, is a product of Mr. Wood's artistic talent. The sketch is so realistic that one might easily mistake it for a picture of an actual model. The Zephyr is the first commercial transport to use a modification of the Fowler Flap. This device gives it a wide speed range. The lugs which carry the flap may be seen at the trailing edge of the wing in the drawing.

Picture No. 1 comes from Ralph Guernsey of Posey, California. Fans will easily recognize it as a very remarkable model of a Boeing P 26-A. Too much cannot be said concerning the detail and workmanship displayed on this little ship. To appreciate it one would have to see the actual model, rather than the picture. It won first prize at the California State Fair at Sacramento for the year 1937. This was the second year running that Guernsey won the scale model event.

The ship is built to a ¾ inch scale and is built up of balsa. The model embodies all details, including instruments, working controls, working throttle and spark levers, machine-guns, safety strap with working buckle and fire extinguisher. All insignia and painting was done by hand. Guernsey says he would like to come to the Nationals with this model some year. We suggest he send the model for entry in the scale model event in care of the contest director. He himself does not have to appear. One of the objections he mentioned is that models are always wrecked when returned to the owner. Occasionally they are, but we wish to differ when he uses the word "always." Guernsey's model is finished in metal-like smoothness.

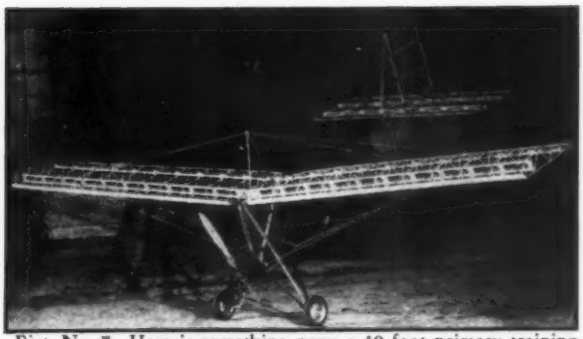
Many builders perform an excellent job up to the point at which the finish is applied to the model. Here they feel that their work is done, or that the finish is not important but will take care of itself. This is not the case. It is an art to finish a model properly and we suggest that scale model builders pay extreme attention to this part of their work if they wish to win prizes.

Pict. No. 3. Joe Mack, though crippled, won three first places lying on his back at the South Carolina "Legion" Contest.

Pict. No. 5. John Day's duration thirty inch model in full flight.

Pict. No. 4. J. Bullmaster and a 10 foot Bomber.

Pict. No. 6. This solid scale Bellanca "Aircruiser" has all the "doodads" on it. It took G. W. King 300 hours to build.



Pict. No. 7. Here is something new; a 10 foot primary training glider built by Ray Nelson in full detail, powered by a phonograph motor.

One of the fillers that your editor has found most satisfactory is one which was developed after a year's research for a manufacturing concern. Whereas most fillers increase the weight of balsa to a very large degree, this filler increases the weight approximately only four per cent. The process is as follows:

Prepare a sizing of granular fish glue. This is mixed with water and boiled. The solution should be fairly thin so that when it is dropped from a spoon it barely starts to thread. Apply this solution to the surface with a brush quickly and smoothly. The finish will be better if the surface is cool and the glue hot. Be sure to put on a smooth coat. If you wish, the parts may be dipped. After the glue has dried to a state of brittleness, sand very lightly with fine sandpaper. Do not sand the glue entirely off but merely smooth down its rough surface. After this is done varnish, dope or other finishes may be applied. The result will be remarkable. One coat of varnish on top of this surface will give you a glass finish.

Picture No. 2 shows a remarkable job in the nature of a Grumman Gulfhawk, built by Arthur Hardt of Chicago, Illinois. Many will recognize this as Al Williams' famous ship. It was built from a Comet kit. The model has movable controls, retractable landing gear, retractable, swivel ling and shock-absorbing tailwheel. The motor is made up of over 1,000 pieces. The fuselage is covered with sheet balsa and the whole job is exactly to scale in every detail. Even every metal plate and rivet that is found on the prototype appears on the model. This is something! There are not many scale models about which one can boast of its completeness to this degree.

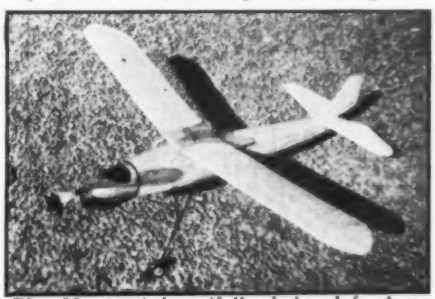
Picture No. 3 shows a young man with a large store of perseverance. He is Joe Mack, 15 years old, of Fort Mill, South Carolina. Though he is lying flat on his back due to a bone ailment, he nevertheless won three first places in the South Carolina American Legion's second annual model plane contest held at Rock Hill, S.C. Joe entered five different models in the contest. The principal award was a silver trophy with a mounted figure of a plane, offered by Captain Elliott White Springs, wartime flying ace and novelist.

John William Bittick of 6206 Grand Street, Saint Joseph, Missouri, who is president of the Model Aero Club of St. Joseph, sends us picture No. 4. It is a shot of James Bullmaster with a large eight foot Friedrichshafen Bomber that was built by members of the club. It is built entirely of white pine and was used as a feature attraction in the Aviation Act in the Boy Scout Jamboree held last spring in the Municipal Auditorium at St. Joseph. In the act the model was towed across the auditorium on wires. It was to be shot down by a DeHavilland IV, built by Mr. G. R. Huffman, the club director. However, due to a defect in the suspension device, the Bomber broke loose prematurely and crashed. Bittick tells us that it was most realistic but heartrending.

In picture No. 5 we see an endurance model, built by John Day of Palisades, New York, in full flight. There is no question about its flying qualities. Day tells us that he has had flights of over five minutes very often. The ship has a thirty inch wing span and is a comparatively slow flier. Day wishes to have us announce that he would be glad to hear from other model builders in order to exchange ideas with them.

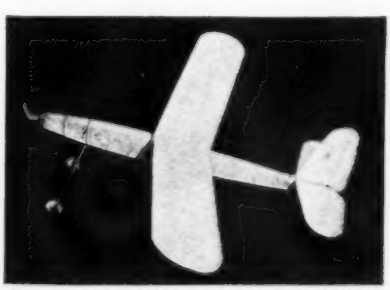
One of the most unusual large ships ever built was the Bellanca "Aircruiser." In picture No. 6 we see a very unusual model of this remarkable plane. It was built by G. W. King of 844 Cormorant Street, Victoria, B.C., Canada, and was exhibited twice at the Y.M.C.A. Hobby Fair in Victoria. In 1935 it took first place, and in 1936 it placed second. The plane is a very excellent piece of work. As you can see, all details have been faithfully carried out. It took 300 hours to build and has a span of twenty inches. This is not a detail model but rather all parts are solid. Mr. King not only built the model but took

(Continued on page 58)

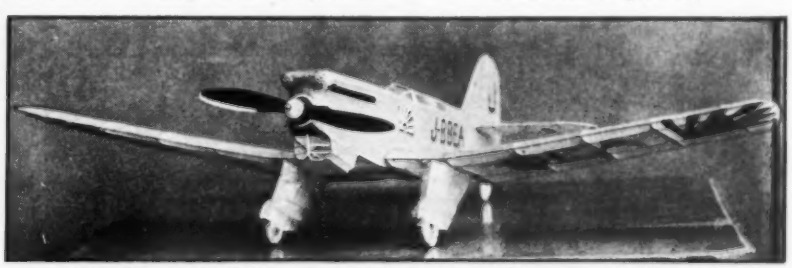


Pict. No. 8. A beautifully designed fuselage job that flies consistently, built by Wm. Bouldin 3rd.

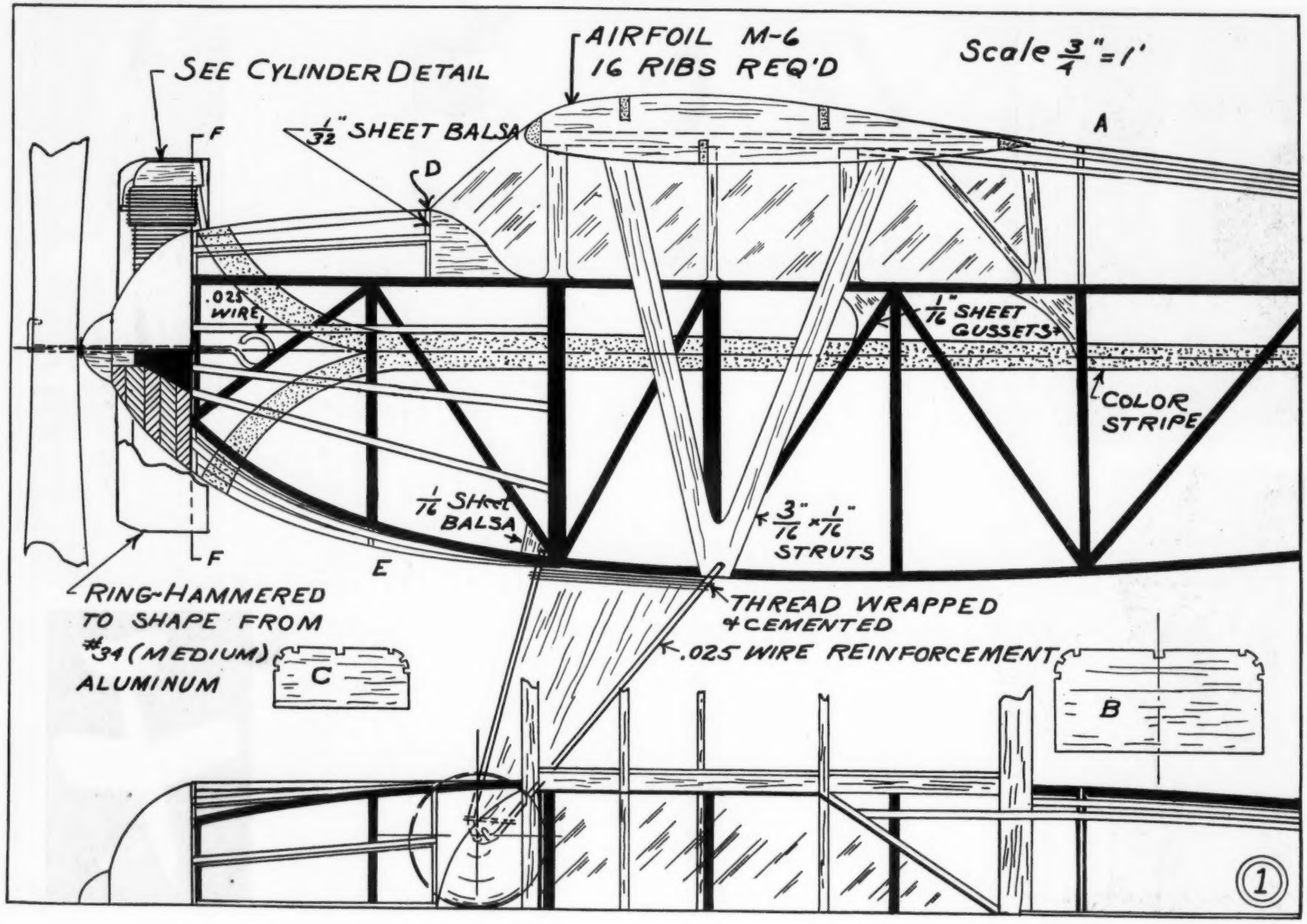
Pict. No. 12. Mr. Ed Clarke, Junior Aviators Nat. director and Albert Broz, who won the original design event.

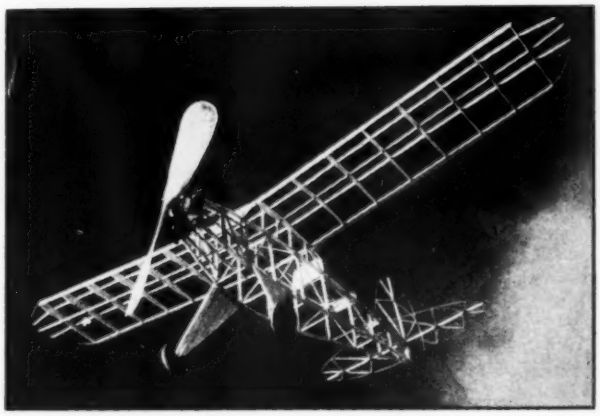


Pict. No. 10. A flying job by Kaye Polites that made an 18 min. out of sight flight.

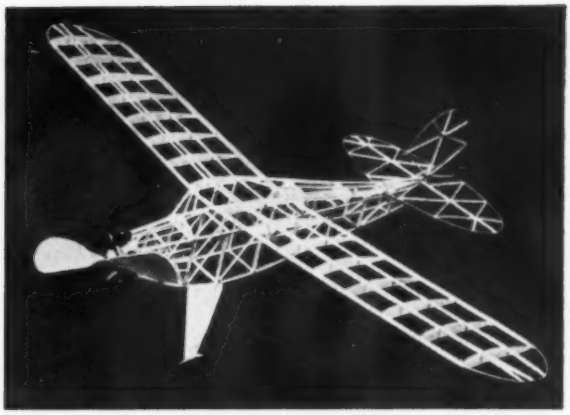


Pict. No. 11. A flying scale model of a Kawasaki C-5 by H. Minowa.


SEE CYLINDER DETAIL
AIRFOIL M-6
16 RIBS REQ'D
Scale 3/4" = 1'
1/32" SHEET BALSA
A
F
D
.025 WIRE
1/16" SHEET GUSSETS
COLOR STRIPE
1/16 SHEET BALSA
3/16" x 1/16" STRUTS
F
E
RING-HAMMERED TO SHAPE FROM #34 (MEDIUM) ALUMINUM
C
THREAD WRAPPED & CEMENTED
.025 WIRE REINFORCEMENT
B
1



The filled-in landing gear struts increase stability.



The structure is well designed and very strong.

Building A Flying Scale Rearwin Sportster

Here's a Good Looking Model of a Popular Sport Plane That Is a Fine Flier and Easy to Build

By HERBERT K. WEISS

WITH the rapidly increasing number of planes employing monocoque construction, the model builder in his search for an easily built scale model with unusual flying characteristics is drawn inevitably to the light plane field. Replicas from this class invariably outnumber all other types at flying scale model contests. Such ships are the Taylor Cub and the well-known Monocoupe. We present here a model destined to make a place for itself in the ranks of those scale models which do not sacrifice scale appearance for flying ability, nor duration for accuracy of reproduction.

The Rearwin Sportster, powered by a Warner Scarab engine, is one of the more luxurious of the light planes. Its 90 hp. engine pulls it along at a top speed of 120 m.p.h. It has a cruising range of 475 miles.

The model has been clocked officially at 1 minute, 12 sec. in contest flying, winning an easy first. Since then a free wheeling prop has been added and outdoor flights average two minutes and up, with indoor performance at about fifty seconds.

Fuselage

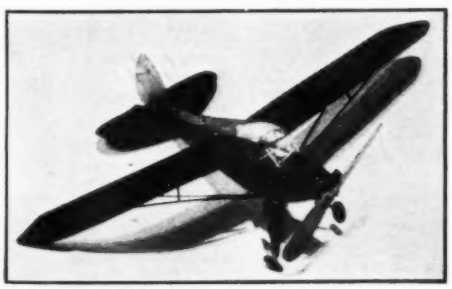
The fuselage is of standard construction. Build two side panels to the heavy black lines in the plans. The longerons and cross braces are 1/16 sq. hard balsa, except for the two compression struts at the landing gear which are 1/16 x ⅛. When the two sides are dry, turn them upside down and pin them the proper distance apart on your work bench or some smooth level surface. Cement the cross pieces in place, being careful to keep the whole structure lined up evenly. Now make the nose block. This may either be carved from a solid block or built up of ⅛ thick sheet balsa cut in circular rings as indicated. The diameters of the rings may be obtained from the drawing. Sand the block smoothly and cement it to the end of the fuselage. Now cut out bulkheads, A, B, C, D, E and F from 1/32 sheet balsa and cement them in place. Do not add the stringers at this time.

It is very stable and will climb to great heights.

Wing

Trace the drawing of tne wing with the aid of a piece of carbon paper, putting the carbon paper face up under *both* the plan and the sheet on which you desire the tracing. This will give you the layout of the left wing. You can now lay out the wing, making two halves, then join the two halves by building in the center section with the proper dihedral. Cover the wing leaving the underside of the center section uncovered.

(Continued on page 57)



The cabin and the dummy engine give the impression of a large ship in flight.

How the finished plane looks from the rear. A thrill always results from flying such a realistic plane as this one.

"Cleveland Kits have been and will probably always be the pace-setter." ARIZONA

Once You Build • One of These •

70—Al Williams Grumman "Gulf Hawk"—Rep.

28—Monocoupe—Always a Prize winner

64 — Ever popular Beechcraft Cabinplane

54—Hughes' World Record Racer—Rep.

No wheels, shoes, dopes or power unit supplied in this kit.

GP-66—STINSON RELIANT GAS-POWERED MODEL $8.50

66—Graceful Stinson "Reliant"—Rep.

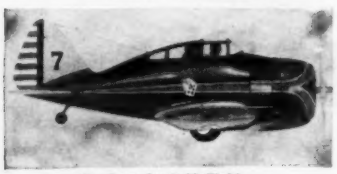
53—Grumman F2 F1 Fighter—Rep.

65 — Lockheed Electra

58—Popular Ryan Sportster—Rep.

60—Boeing P-26A Fighter

59—Hawker Low Wing Fighter—Rep.


61—Seversky P-35 Fighter

21 — Famous Curtiss Hawk Pursuit

★ BUILD KLING'S K

In the winning of the world famous Thompson Trophy for 1937, Kling stepped out into the lead at 256.910 m.p.h., winning the $9,000.00 purse in addition. This clipped-wing monoplane (although with a regulation size fuselage)

CLEVELAND 'R-

These Kits build real master miniatu g a flies, but so identical in detail that le Aces entirely complete except no liquids a ed. 12" to 55⅝" and the dwarf ½" scal om

46 — Laird's "Selution"

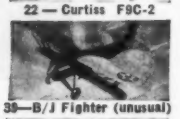
27—Doolittle's G-B

48 — Turner's W. Wms.

7 — Curtiss Hell Diver

50 — Curtiss Exp. Hawk

22 — Curtiss F9C-2


39—B/J Fighter (unusual)

17 — Bayle's Gee Bee

18—Howard Racer "Pete"

6 — Polish PZL Fighter

KIT NO.	NAME	SF ¾" Scale	D's ½" Scale
1	Gr. L. Sport Trainer	$1.95	$ .65
2	Travel Air Mystery	2.35	.65
3	DeHavilland-4	2.85	.95
4	Curtiss "Jenny"	2.65	
5	Laird Super-Solution	1.95	.65
6	Poliah Fighter	2.50	
7	Curtiss Hellidiver	2.95	
8	Army Boeing P12-E	2.25	.80
9	Scouting SE-5	1.25	.55
10	Sopwith Camel	1.95	
11	A-W Quad Fighter	1.95	.65
12	Bishop's Nieuport	1.95	.65
13	Spad 13	1.95	.65
14	Fokker Triplane	1.95	.65
15	Fokker D-7 Fighter	2.50	.75
16	Albatross D-5A	1.95	
17	Bayles' Gee-Bee	1.95	.65
18	Howard "Pete"	1.25	.40
19	Supermarine S6-B	1.95	.80
20	Hawker Fury Fighter	1.95	.80
21	Hawk P6-E Fighter	2.50	.95
22	Macon Fighter	1.95	
23	Boeing P-26 Pursuit	1.95	.70
24	Lockheed Vega	2.50	1.20
25	Curtiss A-8	2.50	
26	Heath Parasol	1.25	.35
27	Doolittle's Gee-Bee	1.95	.65
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30	Nieuport 28 Fighter	1.95	
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32	Boeing 95 Mail	1.95	1.20
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36	Lincoln Sportplane	.95	.25

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8 — Boeing F Army

2 — Travel Air M. S.

9—War Time Loc

3 — DeHavilland-4

10 — Sopwith Wac

13—Rickenbacker's Spad

26 — Heath P Vou

14 — Fokker Triplane

12 — Bishop's N Linco

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$50 Mode

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...eam with red trimmings and black and ...s is one of the most unique additions to th...on Trophy lineup in either scale, ½" or ¾". ...odel has a neat little retracting landing ge...selage flap covering it, very easily made. It ...ike a flying torpedo than any Thompson w... Be sure and build it. The 12" span 16... complete dry (no liquids) SF only **$1.95**

Cadry Dwarf of 8" span, 11¼" long kit on... **$ .65**

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...iatur...g airplanes. Not just something that ...at le...Aces" marvel at their realism. Kits are ...ds a...ed. Spans of the SF ¾" scale run from scal...om 9" to 12⅜".

D's ½" Scale	NAME	SF ¾" Scale	D's ½" Scale	REPS 20" Span
.65	...aco C Cabinplane	2.65	.95	
.65	...uhl Bull Pup	1.65		
.95	...F P-16 Fighter	2.75		
	...eronca Sport	1.95	.65	
.65	...ought Corsair V-65	2.95	1.10	
	...oward "Ike"	.95	.35	
	...ouglas O-38 Obs.	2.95	1.10	
.80	...age's Racer	1.95		
.55	...Martin Bomber	6.50	2.05	
	...aird Solution Racer	1.95	.65	
.65	...33 Wedell's W. Wms	2.35	.65	
.65	...34 Turner's W. Wms	2.35	.65	
.65	...urtiss F11C-2	2.95	1.10	
.65	...urtiss Export Hawk	2.95	1.10	
.75	...H. Comet Racer		1.35	
	...Mr. Mulligan"	2.35	.65	.65
.65	...rumman F2F-1 Fighter			.65
.40	...ughes Racer			.95
.80	...ouglas Transport		3.75	
.80	...onsolidated A-11			.50
.95	...ld Gr. L. Trainer 2TI-E			.65
	...non ST			.65
.70	...awker Low Wing Fight.			.65
1.20	...oeing P-26-A	2.65	1.10	
	...eversky Fighter	2.65	1.10	
.35	...ustom Waco C6		1.10	
.65	...36 Caudron Racer	1.95	.65	
.65	...eechcraft C-17-B		1.10	
.80	...ockheed Electra		2.75	
	...kinson Reliant			.35
	...airey Battle			65
1.20	...7 Bristol Fighter		.95	
.45	...William's "Gulfhawk"			55
.55	...ling's Folkert Special	1.95	.65	
2.95	...moon Kit	.35		
.25	...01 Cleve. Amphibion (28")			.65

...rats...ore Prizes, More Honors ...r Li...odels in the World"

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19 — Supermarine

...Lockheed Vega

20 — Hawker Super-Fury

...Waco Cabinplane

5—Laird Superselution

...Vought Corsair

33—Comper Swift

...Lincoln Sportplane

34 —Fokker D8

68 — Bristol Fighter

38 — Buhl Bull-Pup

40 — Aeronca C-3 Sport

25 — Cur. A-8 Attack

4 — Curtiss "Jenny"

47 — Wedell's W. Wms.

29 — Navy Boeing F4B-4

30 — Nieuport 28

31 — Hall's Racer

32 — Boeing 95 Mail

GP-69—REARWIN SPEEDSTER GAS-POWERED MODEL $4.85

No wheels, shoes, dopes or power unit supplied in this kit.

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"The detail in your C-D plans is the best I've ever seen." NEW JERSEY

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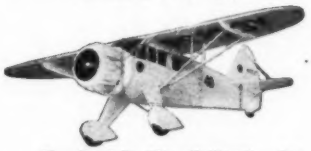
55 — Famous Douglas Transport


52 — Howard's "Mr. Mulligan" — Rep

51—DeHavilland Hi-Speed Comet

67—England's Phantom Fairy "Battle"—Rep.

45 — Hi-performance U.S. Army Martin Bomber

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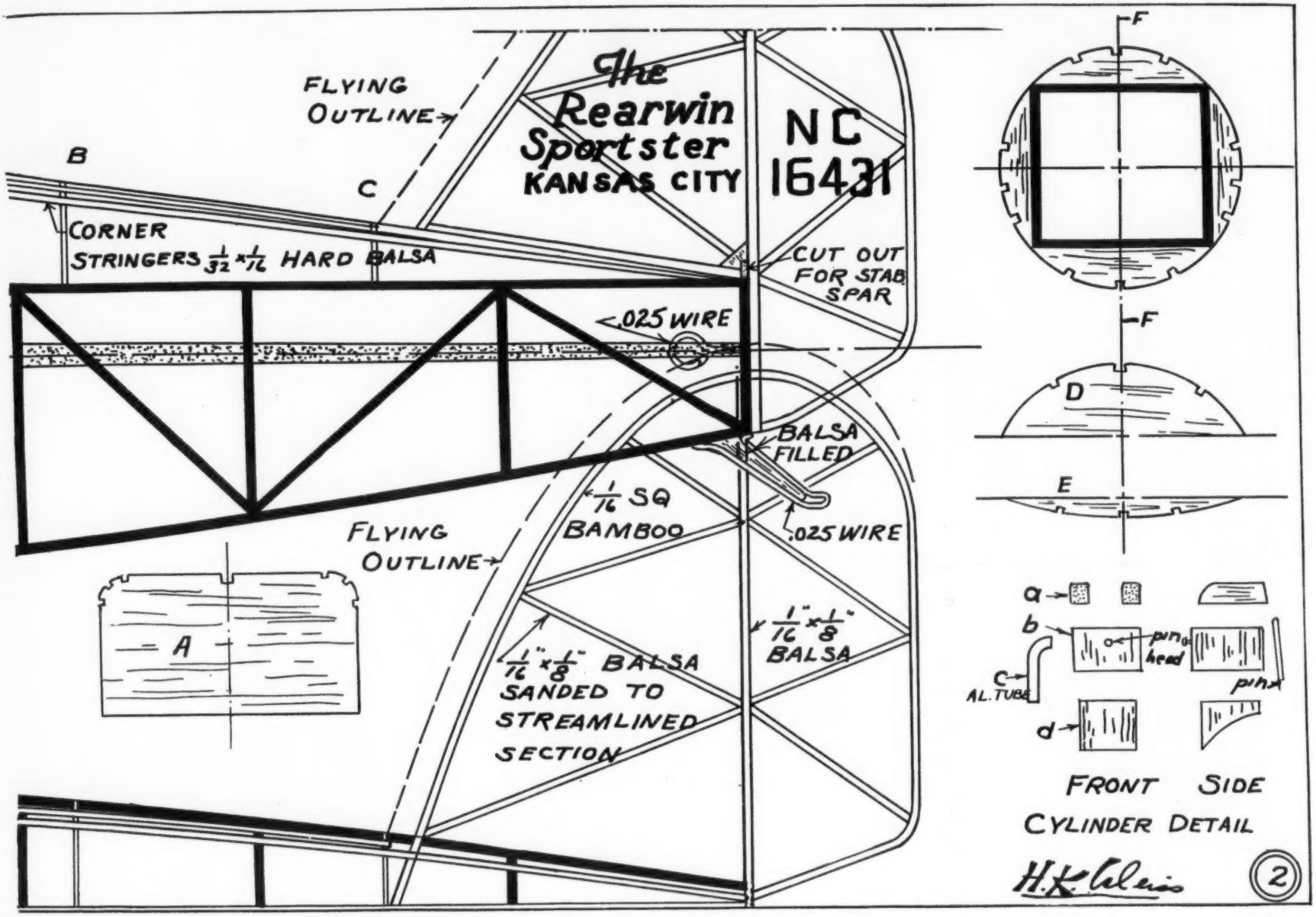
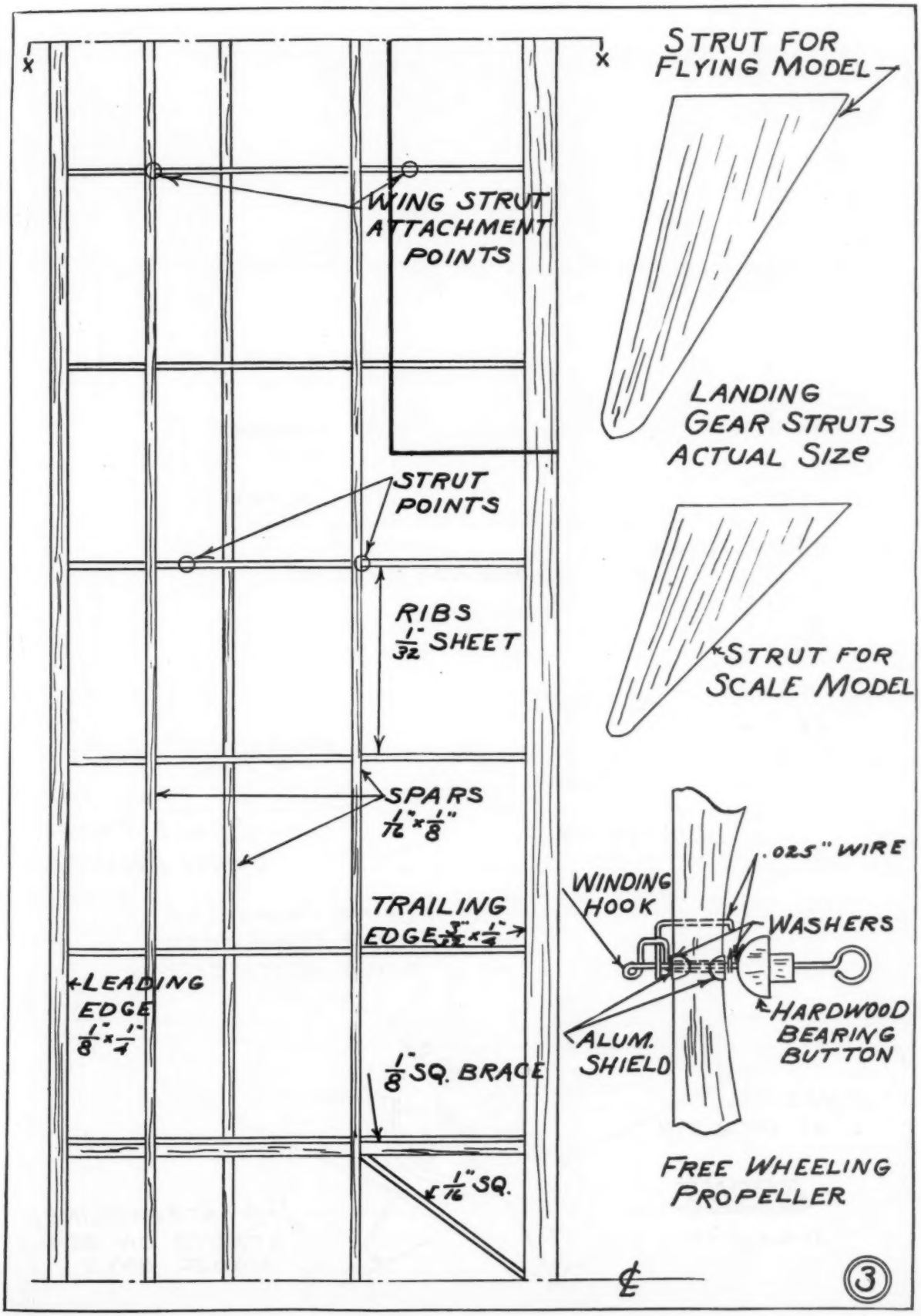
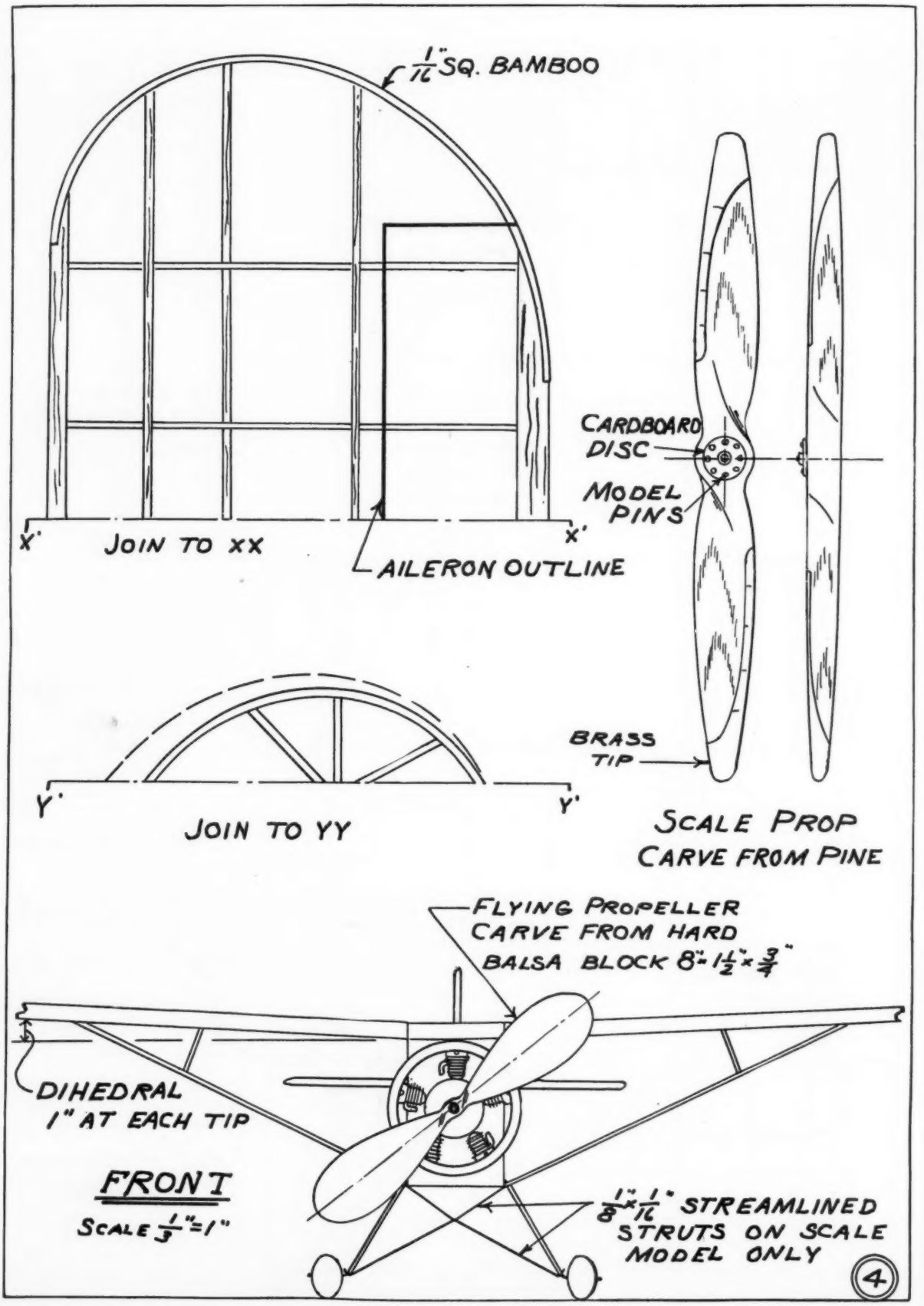

The Rearwin Sportster
KANSAS CITY
NC 16431
FLYING OUTLINE
B
C
CORNER STRINGERS 1/32 x 1/16 HARD BALSA
CUT OUT FOR STAB SPAR
.025 WIRE
BALSA FILLED
1/16 SQ BAMBOO
.025 WIRE
FLYING OUTLINE
A
1/16" x 1/8" BALSA SANDED TO STREAMLINED SECTION
1/16" x 1/8" BALSA
F
F
D
E
a
b
pin head
pin
C
AL. TUBE
d
FRONT SIDE
CYLINDER DETAIL
H.K. Calvin
2


X
X
WING STRUT ATTACHMENT POINTS
STRUT POINTS
RIBS 1"/32 SHEET
SPARS 1/16" x 1/8"
TRAILING EDGE 3"/32 x 1/4"
LEADING EDGE 1/8" x 1/4"
1/8" SQ. BRACE
1/16" SQ.
STRUT FOR FLYING MODEL
LANDING GEAR STRUTS ACTUAL SIZE
STRUT FOR SCALE MODEL
.025" WIRE
WINDING HOOK
WASHERS
HARDWOOD BEARING BUTTON
ALUM. SHIELD
FREE WHEELING PROPELLER
3


1/16" SQ. BAMBOO
X'
JOIN TO XX
X'
AILERON OUTLINE
CARDBOARD DISC
MODEL PINS
BRASS TIP
Y'
JOIN TO YY
Y'
SCALE PROP
CARVE FROM PINE
FLYING PROPELLER
CARVE FROM HARD
BALSA BLOCK 8" - 1 1/2" x 3/4"
DIHEDRAL
1" AT EACH TIP
FRONT
SCALE 1/3" = 1"
1/8" x 1/16" STREAMLINED
STRUTS ON SCALE
MODEL ONLY
4

SCIENTIFIC GAS MODELS LEAD THE FIELD in POPULARITY!

All Scientific Gas Models have been designed by Contest-Winning Builders and offer you the proven experience of seasoned Model Aviators. Here are 3 of the most popular models of Champion Contest Winners and all presented for general sport or contest flying.

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DESIGNED BY MAXWELL BASSETT

WINGSPAN, 6 ft. WEIGHT (less motor), 2¼ lbs. LENGTH, 43 in.

COMPLETE KIT WITH

READY-MADE BALSA RIBS WITH NOTCHES FOR SPARS
STAMPED METAL NOSE COWLING WITH ENGINE HATCH

This new type Gas Model is remarkably true to Big Plane scale and still retains contest model performance. In test flights it has shown unusual efficiency and proven itself repeatedly. It is absolutely correct in aero-dynamic design and constructed to withstand hard shocks incident to gas model flight. It is practically crashproof. Has detachable wing, adjustable rudder control and stamped nose cowling which completely hides engine, with hinged hatch for accessibility.

Kit includes printed balsa wood; selected strip balsa cut to correct lengths; liberal quantities of nuts, bolts, hook-up wire, tough landing gear wire, washers, electrical connections, miniature wood screws, gas model cement, bamboo paper and colored tissue, celluloid, rubber, etc.—Everything required to complete the model.

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GUARANTEED TO FLY

RED ZEPHYR

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Precision Built with every Quality Feature

WINGSPAN	WEIGHT (less motor)	LENGTH
6 ft.	2½ lbs.	56 in.

In addition to holding the Championship of France, this model has also won high honors in many American contests. Equipped with full shock absorbing landing gear with spring brackets, vibrations absorbing motor mount, crashproof landing gear, reenforced nose and hood, demountable wings, 3½ Pneumatic Rubber Wheels—a beautiful and efficient looking ship giving remarkable performance in the air. Kit includes liberal quantities of all materials required to build entire model with full size plans picturing and explaining every detail.

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⅜" bore; 15/16" stroke; 1/5 H.P.

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The world's most powerful, lightweight, modern engine for its displacement.
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Kit ..... $ 9.85
Assembled Motor 14.00
INVERTED ENGINE
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GWIN AERO
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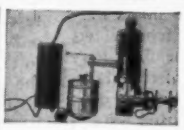
Kit $11.35
Assembled Motor 17.50
INVERTED ENGINE
Kit 11.60
Assembled Motor 18.25



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Distributors for Champion Spark Plugs
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JAP-FIBRE paper superior to silk for GASOLINE POWERED MODELS. Weight and strength properly proportioned. Natural shade. Handmade.
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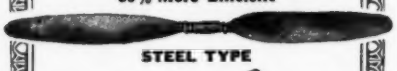
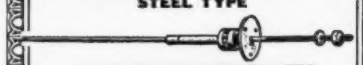
BROAD BLADE
50% More Efficient


STEEL TYPE


BRASS PROPELLER SHAFTS

MINIATURE CELLULOID MOTORS
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Modeling the Short Sky Liner

(Continued from page 13)

Trace the top view of the wing and then after cutting away excess balsa, taper the wing as shown in the front view. This may be accomplished with very rough sandpaper.

A sharp knife is used in shaping the wing as shown in the cross sections but sandpaper is again used to complete the operation. When the wing is completed, work on the motor nacelles and cowlings.

Engine Nacelles and Cowlings

Engine nacelles and cowlings must be made of soft balsa. Note that the engine cowlings also incorporate the cooling flaps. By referring to the sectional diagrams of the cowls we find that a sandpapered groove will produce the required effect in the making of the cowls and cooling flaps. Also note that air scoops are cemented at the bottom of each cowling.

Engine nacelles are now constructed. Care and patience must be exercised or the nacelles will not be constructed properly. The same process used in making the fuselage may be used in making the nacelles. After top and side views have been completed and sanded to shape cut out a slot into which the wing is fitted. Should the builder experience difficulty in cutting out the slot, he may slice the entire nacelle horizontally in half and proceed cutting out the slot on the upper and lower half of each nacelle. The two halves are then cemented together and the completed nacelle cemented to the wing. The engine cowlings are then cemented to the nacelles and construction is then begun on the tail assembly and wing floats.

Tail Assembly and Wing Floats

Rudder and elevators are traced and cut from $\frac{3}{16}$" sheet balsa. Smooth sandpaper is utilized in the finishing of the surface. When both surfaces have been completed, cement them to the fuselage as shown in the diagram.

We are now to begin construction of the wing floats. Views of the floats may be obtained from the side and front views of the ship. A top view of the float may be found on the second plate of the plans. The same process as used for the construction of the fuselage is used in the construction of the floats. Struts supporting the floats are made of bamboo and their true length may be obtained from the front and side view of the airplane. After cementing struts to the floats we must assemble the ship.

Assembly

The wings are first cemented to the fuselage. These are held in place by cement and if the builder chooses, by dowels or bamboo strips. The additional supports are inserted into the wing and fuselage and then the cement is applied. As the wing itself is designed to incorporate the fillet, very little plastic wood or filler is required to fillet the wing and the fuselage. The wing floats may also be cemented to the wing at this time if so desired, but the builder will find it wiser to paint the model before attaching the floats to the wing.

Painting the Model

The entire ship is painted silver. The bottom of the hull is painted red as shown in the diagrams. The amount of paint applied to the ship will depend upon the wood used and the type of surface desired by the builder.

It is advisable to sandpaper the model after each coat of paint has dried. After the proper finish has been obtained we indicate the control surfaces with a thin black line. This line may be made with a ruling pen and India ink. The windows are then cut out of black paper and cemented to the fuselage as shown in the plans. The plane markings may also be cut out of black paper and cemented to the wings and body. Black paper discs are cemented to the front of the cowlings before the propellers are put into place. Note that the propellers are three bladed metal props and may be bought ready made. Pins are used to hold the props to the plane. The name of the plane may be written on the fuselage with India ink. Radio mast, directional radio loop and the aerials may now be added to the model and a clear coat of lacquer is applied. Allow the lacquer sufficient time to harden before handling the model. With the drying of the lacquer you have completed your model of the Caledonia.

Timing Your Motor Run by Measured Fuel

(Continued from page 13)

due chiefly to differences in the amount of gas needed for starting, it is practically impossible to judge accurately the motor duration. Fortunately by substituting a glass tube for the metal gas tank these objections are easily overcome. The narrow tube raises the depth of fuel over the lead to the motor allowing full tank running conditions and also makes the gas supply visible so that the fuel needed for the flight can be judged *after* the motor has been started and properly adjusted, thus assuring split second performance. The accuracy in actual contest conditions is truly amazing. The only slip-up that can occur would be due to the motor slowing up and running over the allotted time. This is actually very desirable because it causes the resulting low flights to be called delayed giving another opportunity.

The actual mechanism required is easily worked out for any type of model and motor. An ⅛ oz. test tube such as supplied in toy chemistry sets is about ideal for most motors. With a gravity feed motor (Baby Cyclone type) simply pull the closed end of the tube to a point over a gas flame and break it off at a diameter that will tightly fit into the rubber gas line. The tube should be placed conveniently in the nose of the model. The bottom of the tube being at least the same height as the bottom of the old gas tank.

A suction feed motor will require a two hole cork to fit the test tube. Through one of the holes run a gas line size tube to the bottom of the test tube. This may be fastened directly to the motor intake after removing the old gas tank or by means

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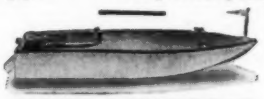

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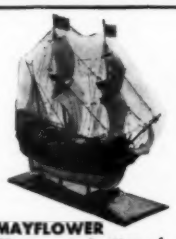

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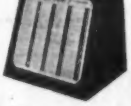

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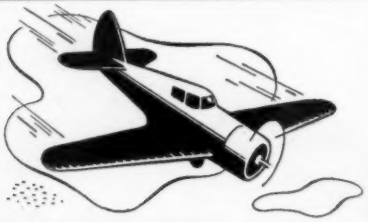

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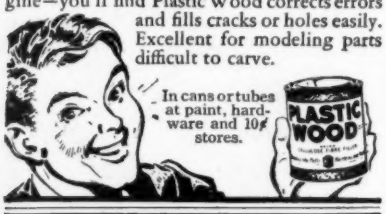

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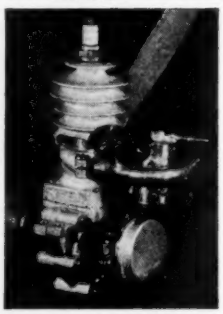

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of a length of tubing may be placed elsewhere in the nose of the model. Placing the test tube slightly above the motor intake (gravity feed position) will often squeeze out more revs from a motor.

With either type of motor put in plenty of gas and run until the gas is down to the mark. Although a test tube all marked off looks very neat its value seems rather questionable. On test flights it is accurate enough to simply guess at it and for contests it seems best to have only the one necessary mark, rechecked immediately before the contest.

If a duration event is to be run off on the same day it seems advisable to leave things open for a quick change to the original gas tank or better yet if the fuel allotment is small make the test tube large enough to hold the duration gas. You will find that a small tank will work better for a ⅛ oz. per lb. contest anyway.

An American View of French Model Aviation

(Continued from page 5)

at the beginning, it is advisable to use the high power design even though the power itself may be small for long prop run. Let's see what is going on at the airport.

The contest procedure was according to the number the contestant cast when he had his model checked. It might be mentioned that one could enter as many models as he pleased with every ship flying on its own ticket. It was therefore possible for a single flyer to cop three prizes if he had three ships and all made the successive high time. The writer was third man up. His "Minute Man" clocked 1m. 35s. Might be mentioned here that the ship was the same as flown in the Wakefield Competition where it had a vicious bank under full power which prevented high climb to bring out its gliding characteristics. The ship was changed in Paris to bring under control the 18 strands of ¼ rubber powering a 17" prop by increasing the dihedral by 2", total dihedral now 6" under each tip. The job now has "it" and can climb with the best of them even with its 11 odd ounces. Later on Alvie Dague had his chance and clocked around two minutes. Sometime in between Andre Vicre put up his Wakefield trial job for close to 6 minutes and it was timed around 15 minutes by the chaser. This flight won first place for him. This job was especially well built; fairly long fuselage with gear return in the rear and a high aspect ratio wing. The job was evidently well adjusted as it had a long steady climb under power and it took a riser wonderfully. Dick Bodle also made a good time of two minutes or more. Herbert Fish had one long string of hard luck in the form of broken propellers. How that lad managed to keep himself under control is beyond me. All this while there were really good flights by the French boys. Many of them bettered the American durations. They had a much longer prop run which again proved its worth since risers were few. I can still hear Alvie muttering what he was going to do when he got back home. Alvie wasn't the only one to mutter as in the distance dark clouds were gathering and it was not long before lightning made long stabs between heaven and earth. Wind changed direction and drops began to "pling" on the wings.

Suddenly the rain began to pour in real earnest. Some sought shelter in the hangars, others crowded into an undersized tent, while Alvie, Dick and I and several French boys crowded under a hay wagon. For a while it was real cozy but soon the wind became vicious and drenched us and the models on the windward side. After about two hours of such dilly-dallying the stormy cloud passed on, leaving a pretty wet group of model builders in its wake. But before half an hour passed the contest was under full swing again.

I really cannot say who made what flight as the whole contest was like a picnic, completed by the rain. It was much nicer to talk sign language than trying to keep track of what was going on. We just listened when we were up. Normally just a number was called, and if there was no response the next number was called and the fellow who failed to answer had to wait until the next round. Since we did not understand French we were called by our names and attention was called to the rest of the boys that one of us was flying and to expect some high climbing. I can only remember that on my second and last trial I gave my 18 strands of ¼ turns way beyond the limit and I managed to clock 2m. 2s. It was quite a joke for a while as "Too-Too" is a cute name for a shrimp of a dog. At any rate the boys managed to get their flights in despite the rain, but since it was late and the ground moist very few approached the two minutes.

Towards the close of the meet, an event for tow-line gliders was held. Their technique is a bit different from ours. In the first place they use several hundred feet of line which is normally rolled up on a hand winch so that the operator can always face the model and so control it. It does seem to be more fun having longer line than the usual 100 feet we use. The designs were a mixture of German and their own. Considering the time of the day and the conditions the time obtained was good.

The sky slowly dimmed and we had to leave the field. Sang on the bus all the way to Paris. Shook hands all around and faithfully promised to come to the Wakefield Competition next year. (Probable date 15th of August, and rules very likely same as this year.) Mr. Denoes and Mr.

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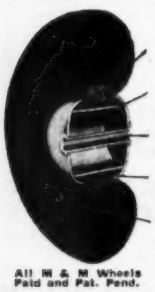

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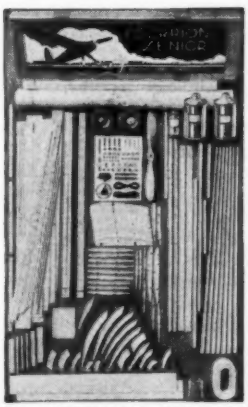

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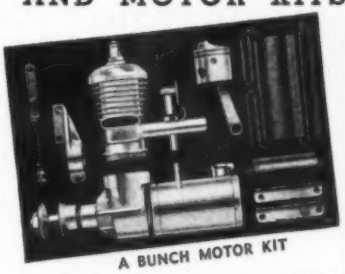

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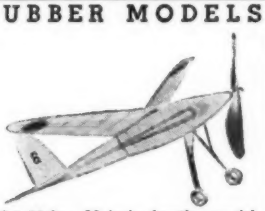

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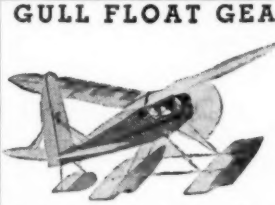

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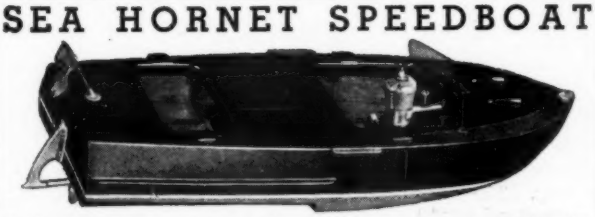

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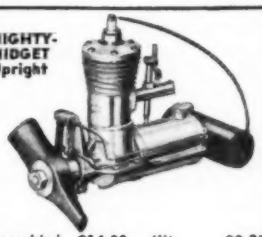

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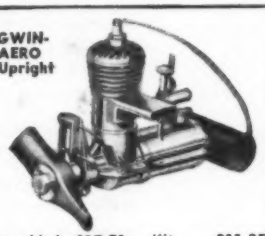

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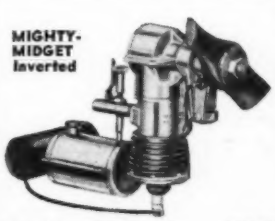

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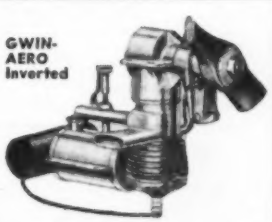

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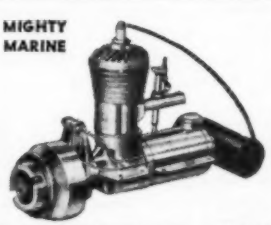

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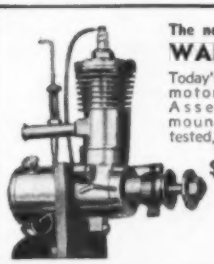

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Guillet and their charming recorder took us to a café, but as luck would have it we were late again and had to be content with the good old faithful *jambon*.

The next day, Thursday, we spent in more sightseeing and buying little trifles for a trifle, and ended the day by seeing an opera. On Friday morning Mr. and Mrs. Herbert Fish, Alvie and I waved Dick off on his way to his ship. Close to noon, Mr. and Mrs. Fish and I sent Alvie off on the Europa. Later on during the day I arranged with Mr. Guillet a trip into southern mountains where a national glider camp was on our schedule, while Herbert and Betty worked out their Hamburg trip. So that when I left Paris that night they were nowhere to be found to say good-by. No doubt they had a very interesting story of their journey to Hamburg where they were met by Mr. Paul Schroeter, second captain and the interpreter for the German Wakefield team.

My trip into the mountains will be remembered for quite a time. Although we booked second class, all seats were already reserved and we had to stand for a spell. We arrived somewhere in France late in the evening and Mr. Guillet knew of another train going from here to a junction on the same line. After investigation I handed the luggage through the window and followed right through as best I could. For a while we sat in the first class compartment but it seems that the conductor was not "a very good conductor" according to Mr. Guillet and we had to change to second class. In this train we had plenty of sitting room and later on enough to stretch and sleep in comfort. For a while we were led to believe that they intended to switch our car to our first train as so many passengers were bound for the same place, and we calmly snoozed on. So you can just imagine how bewildered we were to find the car standing still with no lights and no passengers on it. Mr. Guillet did some fast talking and stepping, and then we both had to step on it to catch our first train which was still crowded to the hilt. Morning dawn found us climbing into misty mountains behind two locomotives and we finally arrived at Mont Dore in mid-morning.

Since the glider camp was way up on top of the "Bonne d'Ordanche the misty weather made car traveling dangerous and it was not until late in the afternoon that we arrived in the camp. A complete description of the place would require too much space. The photo can tell a much better story. The purpose of the camp is to train boys from 16 to 21 years of age the art of gliding and construction of gliders. It is a government venture and the course is three months long. The camp is complete in every respect with well stocked workshop and hangars. It is under the charge of Commander Gertiau of the Air Force. The course had just ended when we came so that we were unable to see their method of instruction.

The students slept in house-type barracks, but the model builders who came to attend the model contest portion of the glider meet were given places in large tents. Mountain air is cool and five blankets with plenty of goose feathers is the usual covering. I really enjoyed this side trip as I was strictly with the French. And what is more, very few of them had knowledge of English. However, the days were full as the mountains themselves were of a character seldom seen in America. They were originally of volcanic nature which can still be seen by the lava strata. Such terrain does not provide sufficient foundation for trees and the like so that only grass and hard roots grow. The grass itself is kept to lawn height by cattle and sheep grazing. So it really was a sight to see such a smooth group of mountains. No wonder that it is real fun to fly large glider models from such a start having complete assurance that no tree will tear it to ribbons. At any rate there was plenty of food and red wine three times a day. No dust whatsoever, and to complete the picture I was told to consider myself a guest of the "Ligue Aeronautique de France."

The model contest portion was held on top of one hill. Not what we would call an ideal spot, but as it turned out the rubber jobs were in the minority and the observer was able to keep them in sight for a long time. The interesting part was of course the large hand-launched gliders. Some of the ships behaved just as their full sized brothers, started straight into the wind, then veered a bit to the left and just when the end of the hill was near they turned right to gain more seconds. The rubber event was won by M. Paulin with time of 2m. 39.9s., and the glider event by M. Peters from Belgium with time of 1m. 28s.

On the next day, Sunday, the gas model event was on schedule. Three ships showed up. The requirements here were that the model must reach 200 feet (estimate) to have the duration count as official. Somehow none of the ships reached the required height, measured by a minute baragraph. The motors, all Brown Jrs., quit after about 50 feet off the ground. I was told that motors run perfectly at home and that the ships seem adequately powered. The height of the mountains, 1,400 meters (4,600 feet) might have something to do with the phenomena. At any rate it is an interesting case especially since one contestant has had the same thing happen to him year after year.

That evening the commandant gave prizes to the boys, and a special plaque from the Air League of France to the captain of the Belgium team and to the writer. It is a gift which shall always remind me of the happy times on Bonne d'Ordanche. It will sure keep the wolf from the door as it is quite a hefty piece of solid silver. Later on after the table was cleared Mr. Paulin celebrated his victory and also the official recognition of his glider record made a year ago at the same spot by ordering champagne by the bottles. I never popped so many champagne bottles as I did that night!

On Monday the Belgians left for home. Most of the French boys stayed on to see more of the glider meet. Although the wind was not very strong several of the pilots managed to stay up for several hours under the clouds. While the glider pilots had their fun, I watched Mr. Paulin and his friends launching their large models. At one time one of his small jobs made over five minutes soaring on the ridges. In between we helped the shock cord crew so that we were mighty glad when the dinner

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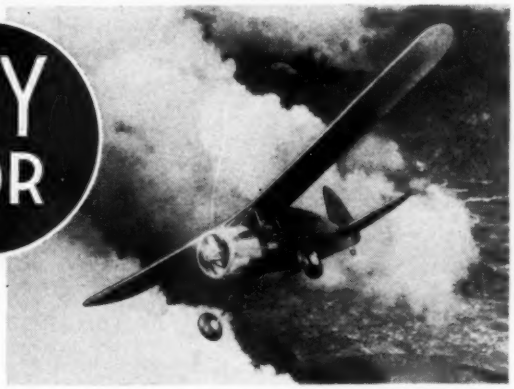

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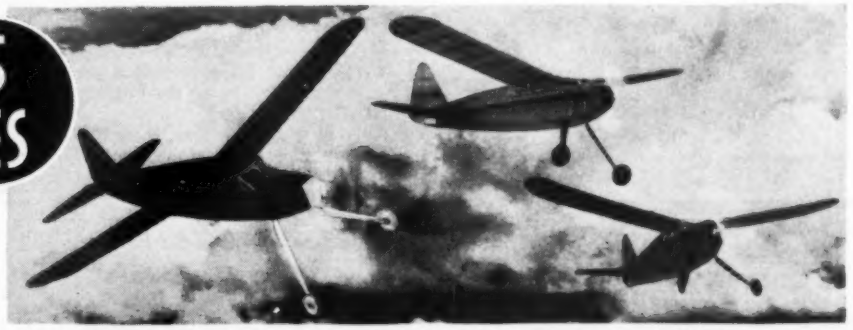

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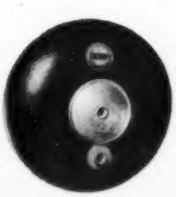

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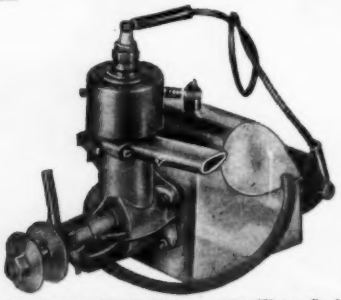

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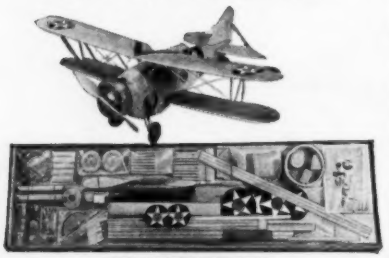

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bell rang.

I left La Bonne d'Ordanche on Tuesday morning with Mr. Guillet. I was on my way to see more of Europe and he was off to his vacation at the seashore. My last sight of the mountains from the train's window was of two soarers as they circled above the mountain close to the tracks. And so ended the pleasantest trip anyone could every desire in France. *"Au revoir, messieurs,* et merci to all."

Eliminating Guesswork from "Prop" Building

(Continued from page 9)

Now it is obvious that if a point is chosen on the center graph that is at the intersection of one of the blade angle lines and a curved line, this point will indicate the depth and width of the block for a propeller whose blade angle is the angle of the straight line and the blade area of which is indicated by the curved line.

However, before it can be determined exactly what blade area each curved line represents in any particular case, it will be necessary to examine and understand the significance of the third part of the combination graph which lies directly below the center graph.

In this part of the graph the required propeller blade area is indicated by the figures at the bottom running from left to right. The figures at the left end of the graph represent required propeller diameters that may be chosen. The diagonal lines running from the lower right to upper left represent values of equal area per inch of diameter for any given cross-section of block. For instance, if our propeller is to have nine square inches of blade area and the diameter is eight inches the point at which the horizontal line running from 8 and the vertical line running from 9 intersect, rests on the 8th diagonal line reading from the left. If we follow this line upward to the left until it intersects the line representing the diameter 4, we shall see that the reading at the bottom of the graph will be 4½ square inches of blade area. In other words, by following along this line from the 8" diameter to a diameter which is ½ the value, the blade area value is cut in half also. This lower graph as can be seen from the figure is connected to the center graph by vertical lines.

These few facts concerning the graph are given in order to show its general functioning and the significance of the lines of which it is composed. At this point no doubt the reader will wish to know just how the graph is to be used. Therefore, we will now follow a concrete example through from beginning to end, step by step. This should clear up any vague ideas. Supposing through calculations or merely because of a whim, you wish to cut a propeller for your plane which will be 8" in diameter, have a pitch of 12½" (which is a little more than one and a half times the diameter) and a blade area of 9". Such a blade area would represent about 10% of the wing area of a plane for which such a propeller should be suitable. Now let us proceed. First we look at the upper graph. In the left hand (A) column for propeller diameter, we see the Figure 8 which is the diameter required for our propeller. Following the horizontal line from 8 to the right until it intersects the vertical line running downward from the pitch value in the (A) column, of 12.5. The intersection of the two lines happens to rest on the 4th diagonal line counting from the left. This relationship of pitch to diameter therefore indicates that this blade angle line is the correct one for your propeller. Following this line down to the left, continuing along it as it passes over the center graph, you will find this line on the center graph shows the blade angle graphically.

It is now the problem to determine which of the curves on the center graph intersect this blade angle line. In order to do this, we shall have to leave the blade angle line for a moment. However, mark the line which is indicated by the upper graph calculation and turn your attention to the values of the lower graph. Our propeller is to have 9 square inches of blade area. It is 8 inches in diameter. The blade area with a value 9 is shown in the horizontal column of figures at the bottom of the graph in column A. Follow the vertical line, representing the value 9, upward until it intersects the horizontal line running from diameter 8. These two lines intersect on the 8th diagonal line counting from the left. In other words, you have determined the amount of area per inch of diameter by finding the diagonal line on which the blade area line and the diameter line intersect. Follow this diameter line upward to the left to the edge of the graph. Then continue on vertically to the center graph following along the curved line over the center graph until it intersects the blade angle line which was indicated as the correct one by means of the upper graph. This is the 4th diagonal line measured from the left. The curved line and diagonal line intersect at a point on the center graph which is 14 squares above the bottom of the graph and 7 squares to the right of the left hand edge of the graph. Column A indicates that the width "W" of the block is 1¾". The reading at the bottom of the graph in column A shows the depth D of the block to be ⅞". In other words, the oblong block which will give the specified diameter, pitch and blade area when the propeller is cut from it by the diagonal method will be 8" long, 1¾" wide and ⅞" deep.

This case shows how to work out a problem where the intersections of graph lines have rested exactly on the diagonal lines. However, in some cases, the intersections will be between the diagonal lines. For instance, if the pitch of the propeller is to be 11" instead of 12", the point of the intersection of the 11" pitch line and the 8" diameter line lines between diagonal line 3 and 4. In such a case, follow down between the two adjacent diagonal lines to the center graph. If it helps you to visualize the problem, draw a diagonal line between line 3 and 4 (measured from the left) over the center graph. In the upper graph the intersection of the pitch and the diameter lines is approximately 55% of the distance from line 3 to 4, toward line 4. Then the diagonal line drawn over the center graph should pass upward between lines 3 and 4 through points approximately 55% of the distance from line 3 toward

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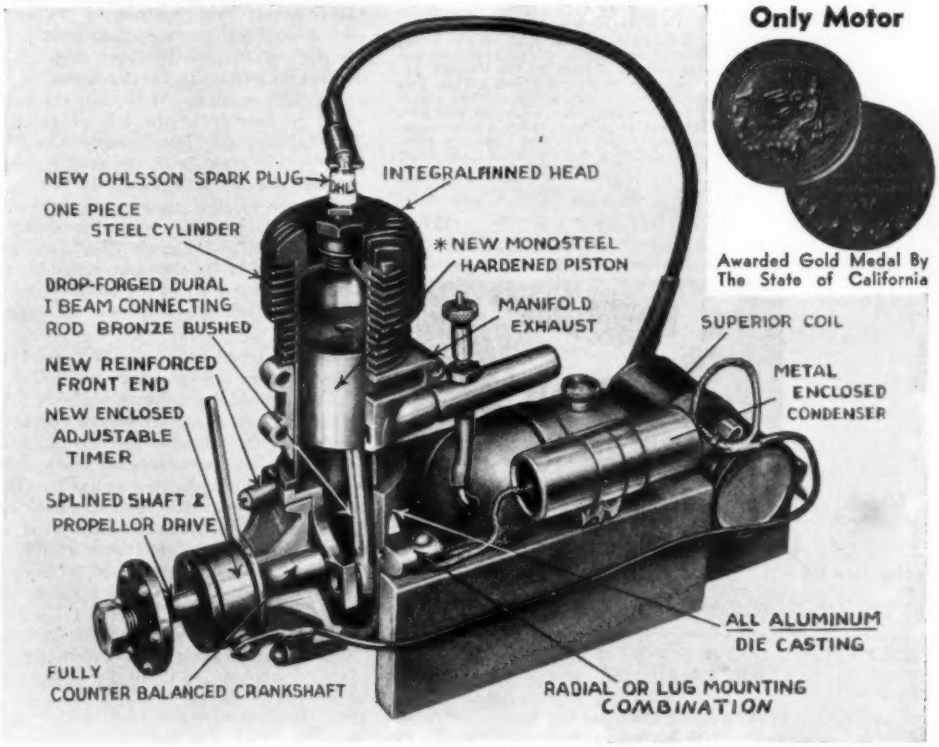
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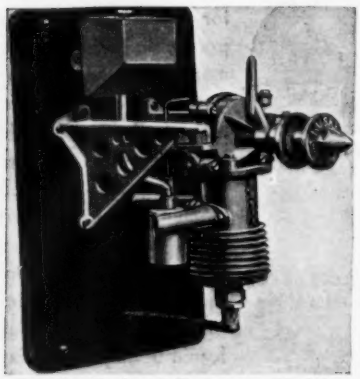

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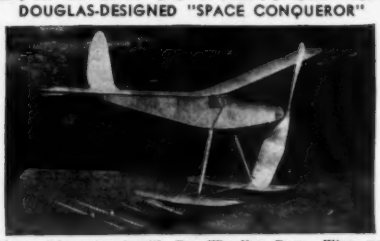

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line 4.

In this case the required blade area is the same as in our first problem, that is, 9", so we follow the 8th line or curve upward across the center graph. The point at which this curved heavy line crosses our blade angle line between line 3 and 4 indicates the value of the depth and width of the block. If you follow this through on the graph you will see that this point is at the horizontal line of the center graph which represents 1⅞" in the left hand (A) column. This means that the width of the block is 1⅞". Pass vertically downward to the lower edge of the graph and we see that the reading for the depth of the block is 13/16" that is, it is just a little to the right of the ¾ mark.

Study the example carefully until you are sure that you understand each point of the problem. With a little practice, very little trouble should result.

On the graph you will note that there are two sets of columns, (A) columns and (B) columns. You will note also that the (B) columns have figures which are double the respective values in the (A) columns. This arrangement has been made necessary because of the lack of space. The graph would be about four times as large as it is if all the values were placed in the (A) columns. For diameter, pitch and blade area values, above those given in the (A) column, use the (B) column and proceed in the manner illustrated by the example. The only difference from the original example is that if you select any one figure in the (B) column on the graph, all values must be taken from the (B) columns and the answer for the width and depth of the block must be read in the (B) columns.

For instance, if our propeller values of pitch, diameter and blade areas were double those in the example we would have a propeller with a pitch of 25", a diameter of 16" and a blade area of 18". In the case of all three of these factors you will note that these double values appear in the (B) columns directly above the values in the (A) columns given in the example. In the pitch column of the upper graph, "25" in the (B) column is directly above "12½" in the (A) column. At the left the value of 16 is directly to the left of value 8. That is, the same lines exactly would be used in this graph with the double values as with the single values. By the same system the original values may be multiplied by 3, in which case the diameter would be 24", the pitch 37½" and the blade area 27". By the same reasoning the width and the depth of the block would be three times their values given in the original example.

In the original example, (W) was 1¾". Where the values have been multiplied by 3, (W) would be 3 times 1¾" or 5¼".

Now we come to a problem which is the reverse of the example just given. Some model builders have propeller blocks from which they wish to cut a propeller. They wish to determine the diameter, pitch and blade area of the propeller when it is finished. This can be done very readily by means of the graph when the propeller is cut from the block by the diagonal method described in the first part of the article. The process is as follows: We shall suppose that the block is 2" wide and 1" deep. In column (A) at the left of the center graph, the width value of 2" is shown 16 squares from the bottom of the graph. The value of the width 1" is shown 8 squares from the left hand edge of the graph in column (A) at the bottom. Follow the line running vertically upward from 1 to the line running horizontally from 2 at the left. It can be seen that these two lines intersect on the diagonal line No. 4 from the felt. In other words, this diagonal line represents the blade angle at the tip of the propeller. Follow this line upward into the upper graph. If the length of the block is 10" you will note that this diagonal line intersects the horizontal 10" diameter line at 15.7" measuring in the (A) column of the pitch table. This is the pitch.

Now the next problem is to determine the blade area of such a propeller. Again pick out the intersection of the lines representing (W) equals 2 and (D) equals 1. The intersection of these lines lies just a little to the right of curved line number 9. Now follow downward along the curved line to the bottom of the center graph, pass on vertically down to the lower graph. At the upper edge of the lower graph follow downward along the diagonal line until this diagonal line intersects the horizontal 10" diameter line. This is the point in which we are interested, but it is not the exact point representing the true blade area. You will note that in the center graph the point at the intersection which we chose, lay a little to the right of the curved line number 9. Actually it is about 20% of the distance to the right of the line 9 to line 10. Therefore, in the lower graph on the horizontal 10" diameter line we must measure to the right 20% of the distance between the diagonal line 9 and diagonal line 10. This brings us approximately to

the vertical line running upward from 13 in column A, showing propeller blade area. In other words the blade area of our propeller will be 13 square inches.

In many cases the model builder wishes to cut his propeller from a block by means of the method shown in Figure 30-A. The block is represented by ABCD. If the diagonal lines on the face of the block are not drawn from the center X to the corners A, B, C, and D, the value of the width cannot be taken as CD. For instance, if the diagonal lines are drawn from N` to M and from M` to N as indicated, the correct value of width to use in the graph calculation is represented by C`D`. In other words, the diagonal lines must be extended in a straight path until they intersect the line CD extended through D to D` and through C to C`. Figure 30-B shows the side of the block. The distance XY represents the thickness of the block at the hub. If the block does not taper from point G to point H your propeller will not have a true helical pitch. If for instance, there is no taper to the block, both front face XD and rear face YE will be parallel. Then the pitch at the tip of the blade will be greater than the pitch near the center of the propeller. In such cases you must be sure that, proportionally, CD is to DH as C`D` is to DE. In propellers of this kind this relationship must always exist. The value for the depth which is to be used in the graph in this instance is DE. The use of C`D` and DE should give you the right pitch and blade area values. Obviously the diameter of the propeller will be equal to the length of the block from which it is cut.

Though the method indicated in figure 30-A and 30-B saves a certain amount of cutting when the propeller is fashioned and requires a smaller block for any given propeller, we advise that you do not use it in connection with the graph calculations unless you understand the whole problem thoroughly. In most cases where propellers are cut by means of other systems than the diagonal method the proportions of the block are not accurately worked out in order to render a true helical pitch. Usually model builders guess at the pitch of the block from which to cut their propellers and do not figure it out accurately so that the correct proportions exist. This not only leads to confusion but to the more vital factor of inefficiency in the operation of the propeller.

When you cut a propeller out by the diagonal method the best procedure is to cut out the blade complete with square corners before the blade tips are rounded to the desired curve. The shape of the blade may be marked out by means of a template and the propeller cut accordingly. Cutting away the corners in this fashion does not reduce the blade area value which is given by the graph. The graph calculations take into account this reduction of area caused by shaping the tips of the blades. In other words the blade area given on the graph is the area of the propeller blades after they have been rounded and completely finished.

We hope that those who are adverse to working out formulas will find this graphical method more palatable to their aeronautical tastes.

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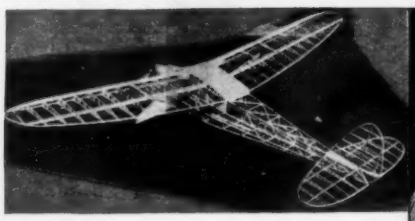

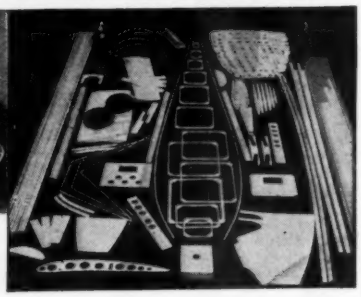

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Frontiers of Aviation

(Continued from page 11)

room for the rear gunner who shoots out the top of the fuselage.

We saw the latest Douglas bomber the other day. It is the one that has been at Dayton to earn the most recent order of 177 Douglas bombers. Basically it is the same as the B-18 ships now being delivered to the Army with apparently only the gun turrets and windows somewhat changed. The nose gun turret has been moved out further, giving the plane a more pointed nose and relieving it of the ugly stubby appearance. Being a big airplane and above the light bomber class there is plenty of room for the gunner. Below and directly aft of him is the bombardier who is now able to see forward as well as downward. The top rear turret is of the "blister" type instead of being retractable.

Another type of gun turret is that used on the Caproni CA135 bomber. A cannon is located in the nose and travels along a slit which runs from one side of the fuselage to the other. Below it projects a machine-gun and without doubt the bombardier is in there somewhere too. Just how the two gunners operate without stepping all over each other is a problem. Imagine the confusion that must emanate from that little gun turret in time of battle—especially with that cannon going full force! The Caproni is a very good-looking airplane except that the fellow who designed the tail must have been suffering from elephantiasis at the time. If it were not for the tail we would say it was as excellent as England's little Blenheim bomber for it is of the mid-wing type powered by two 900 hp. Isotta-Fraschini v-12 engines neatly faired into the wing. The entire bomber is camouflaged and has that "dragon" appearance. It does about 260 m.p.h.

The Breda creation is another mid-wing bomber with the Douglas blunt nose and double-rudder tail. 1,000 hp. Twin-row Fiat engines give it a speed of close to 175 m.p.h. which is not bad for a plane with a 64 foot wingspread.

The Fiat and Piaggio bombers are both perhaps too large to be classed as light bombers. The Fiat is somewhat like the Douglas except that the "belly" of the fuselage curves upward rather abruptly near the tail to permit the installation of a gun turret as on our North American Dragon bomber. 1,000 hp. Fiats also power this ship. The Piaggio has two gunners in the tail with a well designed turret in the nose where the gunner can really go to work on the enemy. Another gunner is located on top of the fuselage near the tail. Though the ship has not the smooth contours of most airplanes it is of efficient design and deserves merit. Two 1,000 hp. twin-row Piaggio engines power the mid-wing bomber.

Perhaps the most pleasing thing in the show to us was the abundant use of American Hamilton-Standard controllable pitch propellers.

The Cant Company can design a good airplane when they want to and this year came forth with a tri-engined bomber mounted on two enormous floats. Usually a three-engined airplane has a clumsy appearance, but this Cant was of the best tri-engined seaplane design we have seen yet. Its low hanging belly had a gun turret fore and aft. The engines are Bristol Pegasus engines built in Italy which give the large ship a speed of 240 m.p.h. according to what the Italians say.

In the racing class was a very unique Nardi FN 305 low-wing long range job that was built to break the speed record across the South Atlantic. The top and bottom of the fuselage are parallel and extend straight back from the radial engine which is way out in the nose. The pilot sits in an enclosure similar to that on Detroyat's racer which is just in front of the fin. The wing is very small and is of plywood covering while the fuselage is fabric-covered with steel tube construction.

Macchi had on hand one of those big seaplane bombers of the "floating" variety —a modern portrayal of Egyptian architecture. We will skip that job.

In the pursuit plane class there was nothing radical or very interesting. They were all of the low-wing type. That is, the more important ones were. We will just list them here. They were the Breda 65, Fiat G.50, Magni single-seater, Romeo Ro.41, and the Romeo Ro.51.

But alas and behold! There were two sportplanes there of Italian origin and built by the S.A.I. Company and Savoia displayed a very peaceful appearing transport, but that was all.

The German exhibits were all of planes that we have described in past issues of this paper. They included the wonderful little twin-engined Ago Kurier, the Arado

AR 96, the Taifun, Henschel dive-bomber, Heinkel pursuit, Halle low-wing five-seater, and the Junkers Ju 86K which is slightly revamped from the former design which we described some time ago. It is a twin-engined low-wing bomber with two 750 hp. B.M.W. engines and is well designed throughout. The skin surface is very smooth and of course, like all foreign planes more or less, construction is metal. Those Germans certainly are enemies of viscosity.

Here is some more news on that Heinkel H.E.112 pursuit which is interesting. There are two machine-guns which fire through the prop and an aircraft cannon imbedded in each wing. The present 680 hp. Jumo engine may be replaced by a 1,100 hp. Jumo 211 engine! Wingspread 32 ft., length 30 ft., height 12 ft., gross weight 2,230 lb., top speed—well they say around 300 m.p.h. and the rate of climb is 460 ft. per sec. Heinkel has just developed a new four-engined transport.

The military activities in this country are now going on at a furious rate also, especially our Navy. Douglas is now delivering her new torpedo bombers very rapidly. Northrop has been doing a lot of testing with their Navy dive bomber and deliveries are practically an actuality. Though the general arrangement is the same as the Army Northrops there are several changes in design. Apparentiy there is a higher stalling angle on the Navy ship for carrier deck landings as the nose sticks up much higher when the plane rests on the ground. The tail wheel sets well in the tail of the fuselage. The vertical tail assembly has been cleaned up even more than on the Army job and is different from any former Northrop creation. The landing gear retracts backwards into nacelles under the low wing.

Glenn L. Martin has just designed a new patrol bomber for the Navy and expects to build 14 of them at an approximate cost of $150,000 each, so they must be big boats!

Consolidated Aircraft, our present largest patrol boat manufacturer, has been battling it out with Sikorsky for orders in a new patrol boat competition sponsored by the Navy. Both are of new design and are in the twin-engined class. It is reported that Consolidated bid $8,052,500 and Sikorsky $9,041,254 for 78 of the flying dreadnaughts.

The up and coming Brewster concern has designed two new types of scout bombers as has Chance Vought and both are in competition for the usual forthcoming orders.

All alone was Curtiss-Wright with bids on two other scout bomber bids when she bid $1,690,174 and $2,928,276 respectively on a large number of planes for the Navy's aircraft carriers.

The new North American trainers for the Navy look very neat with their red, white and yellow naval paint job. North American just received another order from the War Department for 55 more 0-47A observation planes at a cost of $1,731,407.

Boeing's orders for its new four-engined transport are mounting with the receipt of one from TWA for two more, making a total of eight and one from Capt. George Whittell to be used as a private club plane! It will be complete with dining room, lounge, bedrooms and with a capacity for

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thirteen passengers. It will cost the captain in round numbers about $300,000! Well, that is one time the trailer salesman lost out.

Don Luscombe as you have probably already heard is going to produce a small high-wing ship like his others in the Aeronca and Taylor class. It will be powered by one of the very new Continental "50" engines. You better watch this little ship for Mr. Luscombe is a whiz at volume production. It will be mostly metal-covered!

Aeronca has come out with a new ship powered by the present Continental engine which is similar to their Model "K." Fairchild is working on another ship that will probably take the place of her low-wing "45."

Howard Hughes is now on the west coast with his new Sikorsky in preparation for his next spectacular flight. His ship is similar to other S-43s except that the hull is now one huge gas tank and there are not as many windows as on the standard model.

Jimmie Doolittle's Seversky which has been delivered to him will be flown in the sub-stratosphere.

Construction has started on a new Glenn L. Martin flying boat with a 188 foot wingspread! It will carry 100 passengers by day and 66 by night.

Over 100 Vultee V-11-GB attack bombers have been sold to China, Russia and Turkey since their origin a year or two ago. The V-11-GB carries a crew of three, pilot, gunner and bombardier, and is powered by a Wright 850 hp. Cyclone. For attack missions the ship carries twenty 30 lb. bombs, 2,400 rounds of ammunition for the four forward guns and 600 each for the rear guns, and it cruises at 217 m.p.h. at 14,000 feet. Lightly loaded, gross load being 8,853 lb., attack mission speeds are 218 m.p.h. at sea level and 236 m.p.h. at 5,500 ft. For bombing exploits either a 1,100 bomb or ten 100 lb. bombs may be carried at cruising speeds ranging from 203 m.p.h. to 225 m.p.h. with a range of 2,770 miles.

The airplane has been designed for easy maintenance. The fuselage has been built in three sections and each section may be unbolted and replaced quickly if serious damage is done to it. The leading edge of the wing and wing tips are removable so a mechanic can reach the interior of the wing.

If you wish to build the model any size other than that shown the plans may be enlarged or reduced at any photostat store to any size you desire. The entire model is to be made of balsa wood which may be purchased from any model supply company mentioned in this magazine. It is also suggested that you purchase the wheels. Perhaps dummy engines, bombs, props, machine-guns and other accessories may be purchased if desired that will fit your Vultee model. Get black, white, brown and red dope or lacquer in small quantities.

The model will be made in the following parts; fuselage, right and left wing panels, fin and rudder, stabilizer and elevators, engine (details for making complete "F-50" Cyclone may be found in August 1937 issue of MODEL AIRPLANE NEWS), engine cowl, propeller, landing gear and military equipment.

Draw the outline of the top of the fuselage on stock first with the grain of the wood running lengthwise. With care and accuracy cut around the outline with a jigsaw. The enclosure may be solid wood with panels and windows painted on it later or it may be built up with isinglass for windows. (In most recent Vultee models the two windshield panels have been eliminated.) Go over the sides with coarse sandpaper and then draw the side view on the fuselage piece. Cut again and then referring to the cross sections on the plans round out the fuselage with your razor blade. Go over the surfaces with coarse and then fine sandpaper.

The wing panels are made in the same manner, first drawing the top view and cutting, then tapering it down as shown in front view. Referring to the airfoil sections finish them up with a sharp flat chisel. Be sure to cut with the grain.

Cut the tail surfaces from sheet balsa with razor blade and sandpaper to smoothness together with the wing sections.

Shape out the cowl next from a solid piece of wood and sandpaper it. The easiest way to hollow out the inside is to spit it down the middle, chisel out the insides and then join the halves together again with quick drying model cement. Go over the part once more with sandpaper.

If the propeller is to be made, it is best to cut three blades from sheet balsa and cement them to a central hub. The landing gear legs are easily made with your razor blade with fairing flaps cemented on to the bottom. The other smaller parts are more difficult to make and their exactness depends on your skill. The accompanying plans show sufficiently how they are to be made.

After all parts are made, go over them once more with fine sandpaper and then begin the assembly. It is suggested however that all military equipment and dummy engine be painted before attaching them to model. Lay the fuselage in flying position on a flat surface with props holding it in place. Cement the two wing panels to its belly with blocks under the tips to maintain the correct dihedral angle. Be accurate.

Next join the tail units in place and put on the landing gear. Use a piece of straight pin as an axle. Cement engine to front of fuselage and cover with cowl. Join prop to the nose using straight pin as shaft. Go over all joints with model cement and then sandpaper thoroughly. Putty or plastic wood may be used to make the fillet where the wing joins the fuselage.

Paint the entire model as shown by the plans. Many coats will have to be applied before a smooth finish is obtained. It is suggested that after the first coat has dried go over the entire model with fine sandpaper before applying another coat. Wait for the first to dry before applying another. Connect all bombs and machine-guns after the paint job has dried and the model will be completed.

A Stall-Proof Stick Tractor

(Continued from page 6)

a block ⅞ x 1¼ x 9". If inexperienced in carving props, it may be advisable to use one that is machine made. To finish the latter you need only to round off the tips with a razor blade and give final shape with sandpaper.

A simple bearing set-up is shown in detail "M," which consists of 3 washers, 1 "L" type thrust bearing and a shaft on which is mounted the propeller.

It will probably be necessary for best performance that the prop be set for a slight down thrust. That is, the rear end of the shaft is raised slightly. This raises the point through which the thrust line passes under the wing. When so adjusted it will be found that the model has an excellent climb in combination with a flat glide. If your model has a tendency to stall while in power flight when it is at the same time adjusted for the best possible glide, it is recommended that you adjust the thrust line as mentioned, a little at a time until the best results are attained.

This function was attained on the original model with the use of a Travis Multi-Flex Bearing with Free Wheeling Clutch.

About 6 or 8 strands (3 or 4 complete loops) of ⅛ x 1/30 brown rubber is necessary for the motor. Allow a couple of inches slack in the rubber.

Mount the wing on the motor stick in about the position as shown.

The tail structure or empennage is secured to the motor stick by means of white cotton twine *not thread.* Wrap the twine very tightly. This will allow adjustment of the stabilizer angular setting and at the same time prevent jarring loose of the adjustment while in use, if wound tightly.

When all details have been done, adjust the wing position forward or rearwardly until the model balances just ahead of the center of the wing. Now try for a glide.

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Set the stabilizer up or down until the flattest and most even sort of glide is obtained, at which time the model is ready to be wound up for power flights.

Designing Your Gas Model

(Continued from page 27)

major change which this design demands is the lowering of the line of thrust.

In Diagram (C) you will observe that the line of thrust passes through the center of gravity of the C.L.A. This condition does not cause instability to a degree that would make the design prohibitive; in fact, many ships of this type operate very successfully. Some do not, however, due to other bad features in their design.

Some model builders perhaps because of keen intuition, have sensed that the proper thing to do is to mount their motor so that negative thrust (so-called) exists. This means that the motor axis points slightly downward at the front, as illustrated at—(L.T.) in Diagram (C). Thus this new line of thrust is negative to the old line of thrust and axis of the fuselage.

Let us see what magic we have created.

Following the new line of thrust, or—(L.T.) from the front to the rear, we see now that the line passes above the center of gravity No. 1. In other words, our line of thrust is in such a position that greater stability is established. Not only this, but another beneficial condition has been produced. If you draw a line through the C.L.A. and parallel to the —(L.T.) you will see that the center of gravity lies above the C.L.A. relative to this line. In other words, the C.L.A. is now lowered relative to the center of gravity and is below it. Apparently we have discovered a way of lowering the C.L.A. and one which is an important stability feature. The proper thing to do now is to lower the center of gravity to position No. 2, on a line which is parallel with the —(L.T.) passing through C.L.A. By doing this it not only assumes the proper position for stability but stability is increased due to the fact that the distance between the center of gravity No. 2 and the thrust line has been increased. At the same time the distance between C.L. or center of lift and the center of gravity No. 2 is greater.

Both of these conditions increase the stability of the plane. The only fault produced by such a design, is its flight through the air in a crabbing fashion with the tail low. Because of this the fuselage does not pass through the air in a normal horizontal position, that is, its axis is not parallel with the line of flight, but slanted slightly upward. The line of flight of a model such as shown in Diagram C would be approximately along the negative thrust line —(L.T.).

Insofar as stability is concerned, this flight characteristic does not impair stability but due to the crabbing of the body through the air the flight efficiency is slightly lowered. Obviously the resistance of the body under these conditions is greater than if it passed through the air in a path parallel to its axis.

A fuselage may be created with practically the same force arrangement as

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shown in Diagram (B) but with more pleasing and efficient outline, as shown in Diagram (D). In this latter case we have modified the plane shown in Diagram (C) so that it will embody the force setup shown in Diagram (B). The advantage of the type of fuselage in Diagram (D) is that the line of thrust does not have to be tipped to a negative position in order to be assured that it is above the center of gravity.

For this reason the fuselage will pass through the air in a horizontal position when the plane is in flight. The dotted outline shows the fuselage of the original design of Diagram (A). You will see readily that the streamlined fuselage has been drawn so that it has the same center of C.L.A. as the original area. The part that has been cut away from the top has been compensated for by the cutting away of part of the lateral area from the bottom at the rear and from the nose at the front. A small amount of lateral area has been added immediately in front of the fin and a compensating amount has been added to the belly of the ship in front of the wing.

Scale Gas Models

There is one important characteristic which allows gas models to lend themselves to exact scale replicas of large ships to a far greater extent than rubber-powered planes. In the design of rubber-powered planes, all design factors are fixed except the C.L.A. This is the only characteristic which can be changed or adjusted so that it will assume the correct position. This must be done by designing the shape of the body as specified in former articles and in the first of this article. However, in the case of gas models this is not true. Whereas in rubber-powered models the motor is in a fixed position on the line of thrust, in gas models a large proportion of the weight in the form of batteries and spark coil can be moved up or down, backward or forward, as may be desired, to bring the center of gravity in the desired position. This makes it possible to design the outline of the fuselage without considering the position of the C.L.A. relative to the center of gravity. For instance, we shall assume that you sit down at your drawing board and draw a fuselage with the shape that pleases your fancy. This outline may be similar to the one shown in Diagram (E). When proceeding to design your ship in this manner, the first step is to determine the C.L.A. after you have shown the side elevations of your airplane. This may be done by the cardboard method. Cut out a pattern to the exact outline of the ship you wish to build. Then determine its C.L.A. by balancing it on the point of a pin. The point of balance is the C.L.A. Mark this on your drawing as shown in Diagram (E). For perfect stability conditions, it is obvious that the center of gravity must be on a horizontal line with the C.L.A. point. Draw a horizontal line through the C.L.A. (Parallel to the axis of the fuselage.) Then directly under the wing and on this line, mark the center of gravity as shown in C.G. No. 1, Diagram (E). The next step is to establish the line of thrust. We know that this should be placed above the center of gravity so obviously the best type of motor for this plane would be an inverted motor so that the line of thrust would pass out from the nose at a relatively high point (shown at L.T. No. 1). The line of thrust could be established in this position also if an upright motor is used; however, in such a case the cylinder of the motor would protrude out of the top of the fuselage for a considerable distance. From an aerodynamic standpoint this is not important but it detracts from the appearance of your model. Many model builders who do not know the significance of the relative position of these aerodynamic forces, place the motor upright in the plane with the line of thrust very low as shown in L.T. No. 2. In fact, there are many models flying today with this arrangement. We do not say that these models will not fly. However, it is true that they do not possess the same degree of stability under all conditions of flight which characterizes ships with the line of thrust above the center of gravity, as shown in L.T. No. 1. Another difficulty which the low line of thrust induces is the problem of establishing the center of gravity at the correct position. Usually the center of gravity of ships of this type is in position C.G. No. 2. This is due to the fact that the weight of the motor is low and because the builder usually places the battery and coil in the lower part of the fuselage. Thus the greatest proportion of weight of the model is low. The only manner in which the center of gravity can be raised to the proper position in such cases is to place the battery and coil high up in the cabin. In the ship shown in Diagram (E) the battery would have to be placed approximately under the wing on a line with the top of the fuselage nose. Possibly the reader will see here many reasons why his model has not acted in an orthodox manner. We hope it clears up questions of design that may be in your mind.

In the type of ship shown in Diagram (E), obviously the correct position for the line of thrust is in position No. 1. The proportions of the fuselage of this model are such that the center of lift (C.L.) is considerably above the center of gravity (C.G.) although the distance between these two points is not so great as in the ideal arrangement of Diagram (A). Someone may have the bright idea of increasing the wing dihedral in order to raise the C.L. Without question this will help in one respect. However, by doing this, you also raise the center of lateral area, which is prohibitive if you wish good stability characteristics.

Of course the center of gravity could be raised to compensate for the higher C.L.A. but by doing this you decrease the distance between the C.L. and the C.G. Consequently you will be right back at the point from which you started. Do not make the mistake of putting to much dihedral on your gas model. If it is properly designed in other respects a maximum dihedral of ¾ inch per foot of wing span will be sufficient.

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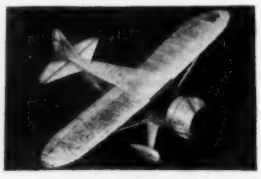

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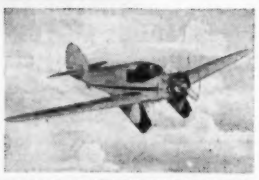

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Build and Fly This Miniature "Cub"

(Continued from page 19)

the rear, he could return the model to earth simply by stopping his running and hauling the ship down. The idea works well if you know how. On the first hop from the open field, the Cub took off from dead standstill rising beautifully to a height of fifteen feet, gathering speed all the while. Mr. Grant was hot in pursuit still holding the cord. To attempt to bring the ship down as it was steadily mounting would have proved disastrous. The ship got off too fast and too well.

Releasing the cord, the Cub continued freely covering the territory below it in wide circles. After fifty seconds of motor run, the ship misjudged the field landing kerplunk into some small trees which obscured a little cemetery. How lucky, I thought, branches are so much more resilient than tombstones.

Its abrupt landing somewhat jarred the adjustable stabilizer mechanism a bit and because we weren't aware of it, the ship was sent aloft on its second hop. Climbing rapidly to about six hundred feet where the engine quit, it nosed downward. Its return to earth consisted of a series of long glides wherein it developed excessive speed only to pull up into cheap imitations of whip stall, hanging there for a moment and continuing downward again. As the Cub neared the ground it soon became apparent that a head on crash into a stately maple was

inevitable. And then it happened. A hundred yards away I heard the tightly drawn fabric sizzle like the roll of a snare drum. Racing toward it, I expected to find the ship reduced to matchsticks. No such hard luck! The damage was relatively minor.

A few minutes later the Cub was off on its third and last flight. Like a good trouper, it put on its best performance and left us scratching our heads wondering what it was all about.

Now that it is all over—we have come to the conclusion that it wasn't a bit too much gas that was poured in, but the little remainder of gas left in the tanks on its two previous flights which wasn't completely sucked up until the third flight. The accumulation was thus completely consumed when the needle valve was opened up a bit wider. On its last flight the ship climbed to the amazing altitude of 1800 feet in two minutes flat! Nine hundred feet per minute or twice as fast as the real ship whose climb is four hundred and fifty feet per minute. We could barely hear the engine at that altitude but watching intently we saw it suddenly slacken up in forward speed and all was quiet. To our surprise, it did not glide into the wind as it did previously, but rose up higher and higher with the wind on its tail until it became a mere speck and soon it vanished completely from sight. The rest of the details are too lengthy to relate, but you can gain an idea of how long our search for the Cub continued when I say that if it were transposed into flying time, the hours would be sufficient to net one a private pilot's ticket.

* * *

The writer wishes to express his thanks and appreciation to Harry Appel for his kind assistance in the construction of the model.

A careful study of the four plate drawings must be made thoroughly in order to assure yourself of an intelligent understanding of every single part of this ship, from the largest to the minutest detail. This is the primary requisite in attempting to build any gas-powered model plane.

Offhand, the drawings seem to be a rather complicated affair, but really they are not. If for any reason certain parts or portions of the plan do not quite convey their general idea, simply refer to the chapter in the text which you'll find explains that particular part in detail.

Fuselage Bulkheads

Plates 3 and 4

The fuselage and turtleback formers have been designed and built in the manner shown solely to obtain the greatest amount of necessary strength with the least weight. Inasmuch as the laminated bulkheads require the greater amount of time to dry, the details of their assembly are taken up as the first step in building the Cub. All bulkheads and formers are shown halved on the plans though they are full scale in size. To get their widths, simply double the dimensions measured from each center line.

Fuselage Bulkhead F-1, Plate No. 3, is made in halves, its design cut from ⅛" hard sheet balsa. The right half as shown

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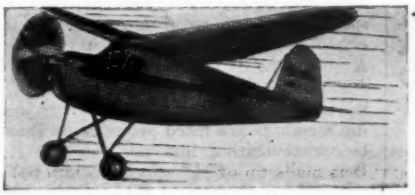

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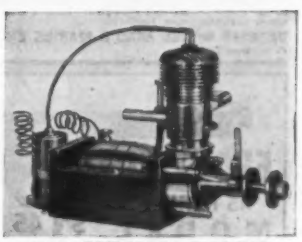

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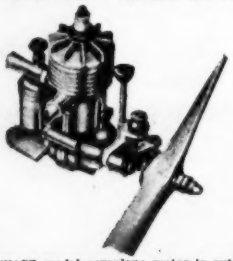

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in the accompanying sketch is made with an opening into which the tongued portion of the left half must fit perfectly. Apply cement generously where inner contacts are made and then press both parts firmly together. Place any reasonably heavy object flat over this bulkhead and allow it to remain that way over night. Now, to both top and bottom sides of this unit, 1/16" sheet balsa is cemented cross grained. Again place weights over this unit to insure a solid lamination.

Later beveled notches are cut in their proper places as shown. Note that they are only cut into half the depth of the bulkhead. See side view of lamination. Bulkhead F-2 which is located underneath bulkhead F-1 is cut to shap from 1/16" sheet hard balsa and notched carefully as shown. Bulkhead F-3 is shaped from 1/4" sheet hard balsa.

The two master fuselage bulkheads F-4 and F-5 are constructed in the same manner. Each bulkhead is made up of two sections as illustrated by perspective view sketches A and B, Plate No. 4, Section A, which is composed of five pieces, is cut to proper size and shape from 1/16" sheet medium strength balsa. (At this point allow me to say that where the use of a specific type of wood is suggested, *use only that kind of wood.* Not a substitute. A substitute is the right kind of article made of the wrong material, or don't you know? The top, bottom and center joining members are fitted perfectly as shown before cementing into position. Section B is made up of 1/8" sheet medium balsa, the general dimensions being the same as Section A. The top and bottom cross pieces of Section B are recessed 1/16" as are the large vertical parts themselves. All parts must fit snugly, then assemble using the cement amply. The next step is to coat the insides of both units with cement and press firmly together. Upon this, place a heavy weight and allow several hours to dry. Bulkhead F-4 is made up the same way as is F-5 the only difference being in the shape of the center joiner.

The turtleback formers, F-6 to F-10 inclusive, are constructed alike and much in the same manner as the master bulkhead Section B. Note direction of grain in each joining member and remember to cut 1/16" recesses in both the vertical and horizontal members. Cement securely and when all bulkheads are thoroughly hardened, mark out the stringer notches accurately and finally remove the excess wood. Your attention is called to the fact that the notches for the side turtlemack stringers are only 1/8" sq. The rearmost turtleback former F-11 is cut to shape from 1/8" sheet balsa and is drilled for two 1/16" dia. holes which will later accommodate the rudder fitting bolts.

Fuselage Frame

Plates 1 and 2

The first step in constructing the fuselage frame is to get something to make it on. And that small problem is solved by obtaining a soft pine board measuring 1" x 12" x 36" plus. Over this plank firmly tack down a full length sheet of either manila or heavy brown wrapping paper. Be sure that the left end and top edge of the plank are perfectly straight so that using a "T" square will provide true course lines. Through the middle of the paper draw a straight line the entire length of the board. This line will henceforth serve as the C/L of the fuselage. The exact position of the upper and lower longerons is in relation to this C/L. Simply measure with either dividers or scale rule their distance above or below the C/L. Full size dimensions are given between vertical fuselage members and turtleback formers.

A fuselage jig is lined up by tapping 3/4" brads into the board at points where found necessary. Note that the upper longeron is cracked very slightly by making a small "V" notch on the top side. The lower longeron is cracked in the same manner and cement is then applied at these points immediately. With the exception of the basswood and rearmost upright member, all vertical and diagonal braces are cut to proper size from 1/16" sq. hard balsa. Cut and cement all joints carefully. The rearmost vertical member whose dimensions are 1/16" x 1/2" x 1 3/4" hard balsa is the tail post and is cut to shape shown on plate No. 2. This, of course, is cemented into position only after the rear portion of the fuselage frame is assembled. Now both frames are joined together by inserting master bulkheads F-4 and 5 as shown in the side view of the fuselage plan on plate No. 1. Cement is generously applied in the bulkhead notches before the frames are inserted and afterwards around the joints formed. Small model making pins may be used for added strength and convenience.

Working back towards the tail from bulkhead F-5, cut to required size the six cross members as shown in the top view of the fuselage drawing on plates 1 and 2. Cement into position using model making pins for added strength. The same procedure is followed in cementing the bottom cross members. The next step is to attach the tail post using the cement generously at this point. Now the last diagonals are placed into position and glued. A length of 1/4" (outside diameter) aluminum tubing 1 3/4" long is cemented securely as shown and then wrapped tightly with a strip of 1/4" silk. Apply a coating of cement over the silk covering. Next, the bottom cross members are cemented into place thus partially forming the cabin. Balsa braces designated A, B, C, are cut from 1/16" x 3/4" x 3/4" and are cemented on the bottom of the fuselage as shown clearly in the bottom view drawing on plate 1. Balsa brace A is not drilled. Pieces of 1/16" hard sheet balsa are fitted flush to the bottom framework. Note particularly the direction of the grain. Now two pieces of 1/32" aluminum (strut fitting D) are cut to the full size as shown and holes are drilled for 1/16" dia. bolts. The bolts are inserted through the bottom of the fittings with the long ends protruding upward into the fuselage.

The next procedure is to cement bulkhead F-1 into position in the forward end of the body frame. Make good cement joinings here. Lower former F-2, plate No. 3, is then cemented underneath F-1. Stringers 1/16" sq. are fitted into the

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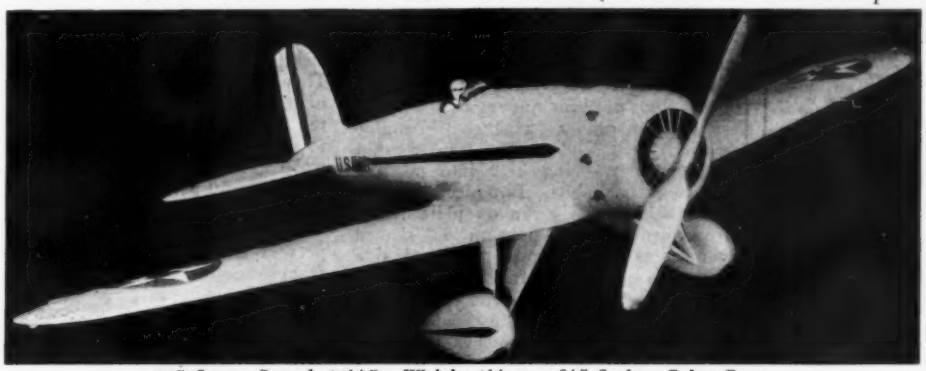

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notches with the rear ends butting against the cross member. Windshield formers W-1 plate No. 3 and W-2, plate No. 2 are cut to shape from $\frac{1}{16}$" medium sheet balsa. Note the semi-circular cut out in the top center of W-1. This cutaway extends part way into the balsa cowling block which is located between W-1 and 2. The cutaway provides for the operation of the toggle switch. The balsa block is only partially hollowed out as shown in the windshield detail on plate No. 3. This unit must be worked out carefully. Now to each underside of the cowling blocks is cemented a balsa lug cut from $\frac{1}{16}$" sheet measuring 5/8" at the front end, 1" at the rear and 2-21/64" long. Both parts must be made perfectly as they prevent the removable windshield from shifting. Lastly, the tie down details are attached and cemented as shown.

The turtleback formers F-6 to 11 are cemented in place spaced by the measurements given in the side view plan. The rudder adjustment fitting is cut to shape, its full size shown on plate No. 2. This is attached with bolts to the front end of former F-11 as shown in the top and side view drawings of the rear end of the fuselage. The tail block pieces shown on plate No. 2 are carved to shape and fitted securely in position between former F-11 and the tail post. Aluminum braces $\frac{1}{16}$" sq. of 1/32" thickness are cut to shape and drilled for ⅛" dia. holes. They are then cemented securely to the bottoms of the square opening. Now a small piece of ¼" outside diameter is cemented securely against the rear end of the tail blocks and wrapped with silk and coated with cement.

Tail Skid

The tail skid is designed with several leaves which are shaped from .020 spring steel feeler gauge stock. You will need about 15" of this material. Four layers of various lengths are broken to proper size by first inserting a piece in a vise and bending back and forth until it breaks off. A center punch is used to mark the position for the holes. Before the holes are drilled it is necessary to heat each piece around the area in which the hole is to be drilled. Allow to cool off first and then drill holes with a $\frac{1}{16}$" dia. drill. The tail skid is attached in the following manner: A piece of balsa TS-2 is shaped as shown and drilled for $\frac{1}{16}$" dia. holes. It is cemented securely at the tail end between the bottom longerons. See tail skid detail drawing for this. Now, a metal fitting TS-1 is cut to shape from 1/32" sheet aluminum. The bolts are then fitted through the holes of the skid leaves arranged in the order shown and inserted upward through TS-2. Fitting TS-1 is next placed over the bolt ends where it is firmly locked into position with the nuts.

Cabin Window Details

The window details are constructed and assembled as follows: Two pieces $\frac{1}{16}$" sq. balsa are fitted into position, the upper ends butting flush to the top front of the bulkhead F-4, while the lower ends rest upon the top longeron of the body at a point just behind former W-2. Bass strips $\frac{1}{16}$" sq. 9 5/8" long are cemented into the bulkhead notches at the extreme top joining at the rear against the upper side turtleback stringer. The construction of the hinged windows is clearly explained in plate No. 1. Place the cabin windows in position and then insert pins 1" long as shown to serve as the hinges. The front and rear side window frames are cut from ⅛" stock with the cellulaid cemented flush on the inner side of these pieces. Now cement securely into position noting the manner in which the turtleback stringer is notched into the

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rear window frame. The last step is to cut out the wing fillet piece very carefully to the shape shown and cement atop the cabin frame as shown on plate No. 1.

Motor Mount

The dimensions and material used in assembling the motor mount skid are given in full size on plate No. 1. This mount does not bear the engine itself, but serves as a runner on which the engine bearer skids slide. The motor skid is detachable, being held into position by two anchor molts. Two pieces of hard balsa, dimensions given on plate No. 1 are cemented securely in an "L" shaped manner as shown in the top and side views on plate No. 1. Note, however, that the "L" does not extend beyond F-3. These runners are then inserted into the fuselage resting upon notches and holes provided for that purpose in bulkheads F-1, F-3, F-4, F-5. Cement the runners well for strength which is absolutely necessary. Next, twelve small balsa blocks ¼"x¼"x⅝" are cut to shape as shown on plate No. 1 and are then cemented into the various stations as indicated in the top and side views of the fuselage. These blocks provide greater rigidity for the stationary runners.

Nose Block Detail

A stiff paper template is made first of the side of the nose block S-1. Cut to shape carefully but at present leave it unsanded. The next step is making part B-1 whose shape is shown by the series of dotted lines which show its side and front view. Note the position for the oil drain hole. Now part F-1 is shaped as shown in the front view. This part has a semi round cutaway. The needle valve hole is cut out only on the right side of the nose block (looking from the rear of the ship.) This hole also extends through piece F-1. Block T is then shaped and cemented into the notches cut out of S-1 as indicated in the front view drawing of the nose block assembly. After both halves of the nose blocks are completed, sand to shape carefully so that they are identically alike. To the inner parts of both halves, balsa pieces A-1 are cut to shape from the dimensions given and are cemented in the position as shown. The cementing of these parts must be carefully done, as the stability of the nose blocks depend greatly on these angular shaped pieces. Complete the nose detail by attaching all pin and eyelet fittings into positions as indicated.

Rudder Construction

The rudder ribs are cut from 3/32" sheet balsa. Rib R-2 is cut from $\frac{1}{16}$" stock. The rudder outline frames are cut from ¼" thickness sheet and are ¾" wide all around.

Note the manner in which the joinings are dovetailed. The main rudder spar measures ¼"x¼"x8⅜". Its lower portion is rounded so that it slides snugly into the aluminum tubing post. A lower rudder spar (drawing on plate No. 2) which is inserted in R-2 at the top, extends downward into the lower part of the outline frame. Rib R-1 is attached to this spar as shown. Cement all joints well and afterward streamline the outline frames nicely.

A No. 2-56 nut is imbedded at the lower part of the rudder frame, as shown clearly in the side view drawing on plate No. 2. Use a sharply pointed knife and cut into the frame only half-way down. Cement the nut, using very little cement. This nut must be allowed a small amount of play in which to change angles when the adjusting rudder bolt is being turned to the right or left. Apply a little plastic wood around the edges of the nut hole, being careful not to get any of the plastic substance into the threads of the nut. The plastic wood should be used only to prevent the nut from falling out of the frame—not to keep it rigid.

* * *

The next issue will contain instructions for completing the remaining parts of the Cub gas model.

Your Career in the Aircraft Factory

(Continued from page 23)

work at a later period. The purchasing and acquisition of materials is another branch of work which is allied with shop work. It should be possible for a trained mechanical expert who has had some business training to assume a job in the purchasing department because here an experience in production and knowledge of materials is most vital.

Another branch of shop work involves a study of the sequence and time of operations. This time study requires mechanical experience and theoretical training. Through this study new methods of production and cost analysis are possible in order to reduce production expenses. The cost per pound of materials, a study of the waste and the utilization of waste more or less requires training in industrial economics. This is a good field for the college trained mechanical engineer.

The point which this discussion is seeking to drive home is that the engineering institutions are producing new men at a faster rate than they can be absorbed by the purely engineering and design staffs of the corporations. Fortunately production work has now attained such a degree of precision, that college trained men are required in this field so that the surplus graduates of engineering colleges have a better chance of finding stability of employment here than elsewhere. Many technically trained men make the fatal mistake of avoiding shop work. Nothing could be more harmful. Bench or machine experience is the finest supplementary background for design work that is possible. An apprentice period in each department should be spent by every potential draftsman or engineer in the industry at large. For one thing, this will eliminate the friction between shop and factory men and disputes over methods of production, and develop a better understanding between the man who "designs" and the man who has to "produce" that design in materials.

The individual who assumes a steady job at a stipulated sum per hour is better off than in administrative work which does not pay any better and has a wider

field of opportunity to draw upon than a comparable person on the administrative staff. The hours of shop work seldom exceed 40 per week. The wages are commensurate with other branches of industry except that the office worker in the more humane firms receives two weeks vacation each year. Unfortunately this idea has not been extended to the production employees, but it is only a question of time when the same will prevail for competent employees here. In the final analysis, work is work whether one does his work with his mind or a pair of soiled hands and overalls.

Building a Flying Scale Rearwin Sportster

(Continued from page 31)

Tail Units

The rudder and stabilizer are very simply constructed. If difficulty is experienced in bending the bamboo outline over a flame, balsa may be substituted. Be sure to keep the tail as light as possible for unnecessary weight here will affect the performance of the ship adversely. The surfaces may now be covered. Do not pull the tissue too tight or they will warp after spraying.

Landing Gear

The landing gear is installed before the fuselage is covered. Note that the balsa fairing is not cemented to the longerons, but is held only to the wire reinforcements by thread and cement. The wires are continuous, from one wheel up the strut, through the fuselage and down to the other wheel. Bind the wire to the cross braces with thin thread at the junction. This type of landing gear is practically unbreakable. The cross struts shown in the front view should not be installed on a flying model as they hinder the shock absorbing action of the gear.

Assembly

Cement to the wing the short vertical members at the center section which join the wing to the fuselage. When the cement has set, attach the members to the fuselage. Now complete the fuselage by adding the stringers. Cover using small strips at the curved sections. Add the tail surfaces.

Engine

The cylinders are built up of balsa and pins as indicated on the plan. They are wrapped with thread before assembly and doped black. They are then cemented to the nose block or crankcase. The drag ring is optional. It is a good way of adding weight to the nose in case your model turns out tail heavy. To make the ring, simply cut a strip of medium aluminum and pound it with a round headed hammer on a block of soft wood until the desired curvature is obtained.

Finish

Since the real Rearwin is built for private consumption, you can choose your own color scheme. If you're after outdoor duration records, better use orange tissue and a coat of orange dope to improve the visibility. If you're a fiend for authenticity, the full size ship from which the plans were drawn, was all silver with a red stripe. After covering, the ship should be sprayed very lightly with water. As presented in the plans the model will stand two coats of thinned out dope all over except for the tail which only takes one coat.

Flying

The model flies very nicely with the scale tail surfaces. For a very stable ship the tail may be enlarged according to the dotted lines. About six strands of ⅛ rubber are required and a very light ship will need only four. Have about an inch of slack. Make major balancing adjustments by adding weight to the nose and minor ones by warping the tail surfaces.

Duration

No attempt was made to turn the original model into a super-light duration ship. By using thinner stock throughout and cutting lightening holes in the ribs and bulkheads, the weight can be reduced about a third. Use of the Clark Y or the RAF 32 wing section instead of the authentic M-6 will also improve the duration characteristics. There is no reason why, with minor modifications, the Rearwin cannot be induced to fly 80 or 90 seconds indoors.

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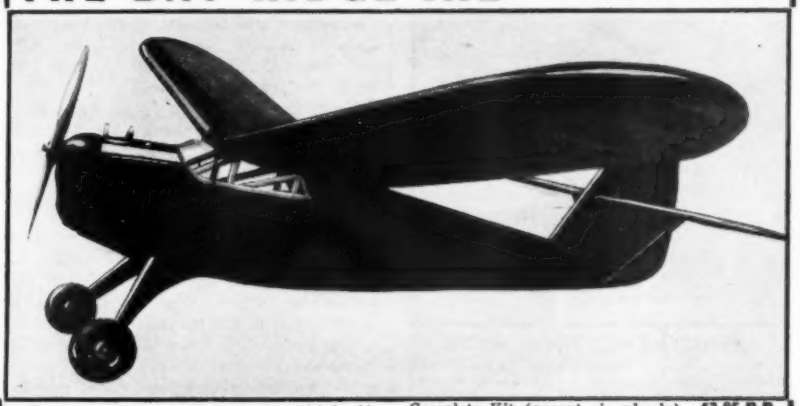

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18" Sheets
1/32x2 6 for .09
1/16x2 6 for .10
3/32x2 6 for .12
1/4x2 6 for .13
3/16x2 3 for .06
1/4x2 3 for .10
1/4x2 2 for .10

BALSA PROP. BLOCKS
1/2x3/4x6 ..4 for .05
5/8x1x7 3 for .05
3/4x1x8 2 for .05
3/4x1 1/4x10 ..1 for .04
1x1 1/2x12 ..1 for .06
1x2x18 1 for .12
2x2x18 1 for .20
1 1/4x2x18 ..1 for .15
1 1/2x2x18 ..1 for 18

BALSA PLANK 18" lengths
1x1.....1 for .05
1x3.....1 for .15
2x6.....1 for .45
3x6.....1 for .68
Wood can be had in 36" lengths or 3" widths by doubling the 18" price. We also cut special sizes. Send in for prices.

CEMENT, CLEAR DOPE, THINNER AND COLORED DOPE
3 oz.....15
½ pint 8 oz....35
1 pint 16 oz. .60

WHEELS PER PR.

Size	Brch.
½"	.01
¾"	.02
1"	.03
1¼"	.04
1¾"	.07
Balsa	Celu.
1" 05	.07
1¾" 06	.09
1¾" 09	.12

FREE bushings with balsa wheels.

BROWN RUBBER
1/16 flat ..20 ft. .05
⅛ flat 17 ft. .06
3/16 flat ..12 ft. .07

BAMBOO
1/16x1/4x15 ..6 for .05
1/16x12" round bamboo 6 for .04
3/32x15" round bamboo 5 for .03

REED
1/16 dia. 3 ft. ..02
⅛ dia. 3 ft....03

DOWELS
1/16 dia. x 12 doz. 05
⅛ dia. 18" 4 for 05

ALUMINUM TUBING
1/16 dia. per ft.....07
3/32 dia. per ft.....07
⅛ dia. per ft.....08
3/16 dia. per ft.....10
¼ dia. per ft.....12

SHEET ALUMINUM
010.... 6x6....06
..... 12x12...20

DUMMY RADIAL ENGINES
1½" 10
2" 15
3" 25

BALL BEARING PROP SHAFT
1/16" dia. shaft 35

INSIGNIA
Sheet containing 4 sets of American, French, English and German. Sheet 06

JAP. TISSUE
All colors 3 for.....05

COLORED BAMBOO PAPER
Light and strong for rubber powered models. Large sheet is 24 x 32. RED and BLUE ONLY.
1 for.....07
3 for.....20

PAULOWNIA WOOD PROP.
5" 05
6" 07
7" 10
8" 12
10" 20

MODEL KNIFE
1 for.....10
Extra blades 3 for.....10

THRUST BEARINGS
Small per doz .10
Large per doz.....15

CELLULOID SHEET
4x5 03
Model pins per pk.....05
Dope brushes small 07
large 08
Nose plugs each 01

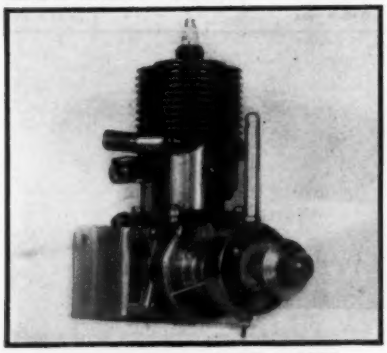
WIRE
010 & 020 5 ft. 02
028 & 034 3 ft. 02

WASHERS
Small or large, doz. 01

Ordering Instructions
FREE postage on all orders over 50c. Add 10c on all orders under 50c. Foreign orders add 15c.

BAY RIDGE MODEL AIRPLANE & SUPPLY CO.
232-45th Street Brooklyn, N. Y.

LITTLE HERCULES



AMERICA'S FINEST MODEL MOTOR

There is no single important advancement that LITTLE HERCULES does not have,—always first in design,—and first in performance too.

Piston Rings, Ball Bearings, lightweight Alloy Piston, etc., all have been introduced by LITTLE HERCULES. Its ignition system and spark coil is 30% more efficient, needing no boosters. You can buy a cheaper motor, but you cannot buy a more reliable, more powerful one.

For planes from 6 to 12 Foot wingspan, it will power your present plane to perfection, while it has sufficient reserve power for that radio job you have in mind. The 1938 Model at $17.75 has a new radial, unbreakable mounting.

Quality and satisfaction are our selling points.

Enclose stamp for literature.

FORSTER BROTHERS

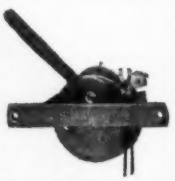
519 Lake Street, Maywood, Illinois

REDUCED WEIGHT

A NEW TYPE IGNITION COIL

that operates without any ignition condenser and weighs only 1¾ oz. Intended to operate on two pen-cells. it is a great boon to the owners of the pee-wee ships.
Postpaid $3.00

FLIGHT TIMER



now reduced in weight to only 1¾ oz. Available in 0 to 60 or 120 seconds for $3.00, and in 3 minute or 5 minute total time for $3.50. Don't lose your ship or the contest because you haven't got a good timer.

NATHAN R. SMITH

1814 W. 8th St. Los Angeles

EASYBUILT (CANADA)

Presents 4 Sensational Flyers, Ea.....**25c**

Post. 5c extra in strong mailing tube

Top left, Howard DGA-9 Bottom left, Cessna
Top right, Stinson Reliant Bottom Right, Taylor Cub

Kits Contain Everything

Ready Made Propeller.
Ready Made Wheels.
Ready Made Nose Plug.
Ready Made Wire Hooks.
Ready Made Strip Balsa.
Plans and Photographs.
Colored Tissue.
Printed Silhouette Sheet
Balsa.
Special Brown Rubber.
Wing Numbers.
Instrument Panel.
Special Dished Nose Bearings
Genuine Crystalite Cement.
Instructions.

MOVABLE CONTROLS IN ALL MODELS!

NEW UP-TO-THE-MINUTE SOLIDS

12" China Clipper.....25c
12" Fairey Battle.....25c
10" Gulfhawk.....25c

Post. 5c Extra

We would like to have you on our mailing list. Write us whether interested in Gas or Rubber Powered Models.

THE EASYBUILT MODEL AEROPLANE CO.

1249 MA-1 College St. Toronto, Canada

Air Ways

(Continued from page 29)

the picture and finished it completely, as he is an amateur photographer. Mr. King also writes that he would like to hear from other readers of Air Ways.

Here, in picture No. 7, we have something that is indeed novel. Mr. Raymond C. Nelson of Logan, Iowa, has gone out of his way to be different. The picture shows a model of a ten foot primary glider which Nelson has powered with a rebuilt phonograph motor. As you can see from the picture, every part of the glider has been included in miniature. Nelson does not tell of its flying qualities; however, we suspect that it will operate very well. We would like to hear more about it. Possibly he will favor Air Ways' readers with a more detailed explanation of this ship and its performance.

About 28 or 29 years ago, Mr. William Bouldin 3rd of 169 Prospect Street, East Orange, New Jersey, started building models and shortly afterward his intense interest in aeronautics carried him into the air in person. He is one of the "Early Birds," that organization composed only of men and women who flew in free flights before 1916. Most of the members of this organization have outgrown the hobby of model flying. Not so with Mr. Bouldin however. In fact, if anything, he is more interested in it at the present time than he was in the "old days." Hardly a week goes by that a new flying creation does not come forth from his little workshop.

He sends us picture No. 8, which shows one of his latest fuselage models. Having seen many of these models fly we can state with assurance that they are unusually consistent in performance. This seems to be the objective of the builder, rather than a periodic unusual performance. "A good flight with every trial" is his motto. In order to do this it is essential that the model designer understand the fundamentals of stability, and not merely guess or "cut and try." A high state of perfection in the art is never attained from the latter methods.

MODEL NEWS FROM OTHER COUNTRIES

England

Mr. Colin Wrigley of 7 Alexandra Drive, Liverpool 17, England, sends us a picture of one of his many ships. It is shown in No. 9. The unusual feature about this plane is that it is a solid scale, ½ inch to a foot, Bristol Bulldog made of cardboard, wood and pins. Making a model of these materials is an art in itself, and one at which Mr. Wrigley excels. This ship has a cast metal Bristol Jupiter engine with polished aluminum cowling. It also includes tube gunsights, metal oil cooler, radio aerial, bombs and bomb racks, as well as cockpit details.

Australia

In picture No. 10 you see a little flying job that is rather unimpressive as far as looks are concerned. However don't let this fool you. This little ship, which was designed and built by Kaye Polites, a member of the Albert Park Model Aero Club of 155 Kerferd Road, Albert Park S.C. 6, Victoria, Australia, has won two trophies. It is a weight rule stick model and has considerable sweepback. The little ship will take off with a nine inch run. In other words it practically jumps off the ground. It has been timed for eighteen minutes out of sight.

It appears that possibly many model builders are going to extremes in their design, when a model following along such fundamental principles without any of the "doodads"—downthrust, etc., can perform in such a remarkable fashion.

We are indebted for this information to Charles Martin, president of the club. He says that their club is affiliated with the Victoria Model Flying Association, a new and progressive organization. There are nine clubs in the union. The secretary is Mr. Reginald Payne, who is well known to all model builders in Australia.

Japan

Model building and flying in Japan has assumed an important role in the education of young men who are taking up aviation as a business. One of the leaders, Hiroyasu Minowa, writes of activities in this country. He is the leader of the Nishiki Club of No. 3, Wakamatsucho, Ushigome, Tokyo, Japan. He has sent us picture No. 11, of one of his models—the Kawasaki C-5 type. It has a wing span of ninety centimeters, or about 30½ inches. As you can see, the model is a product of excellent workmanship. In Japan balsa wood is not used as it is extremely rare and expensive. The materials used are chiefly bamboo and palomia wood. The frame of the ship is made completely of the former and is covered with silk. The ribs are made of thin sheets of palomia wood.

Scotland

We have a very interesting letter from L. A. Middleton and Charles Alexander of 18 Hillend Place, Edinburgh 8, Scotland. These boys are members of the Edinburgh Model Flying Club. They tell us that up to the time we presented plans for the speed model they had great faith in MODEL AIRPLANE NEWS. They imply their faith has been shaken by the fact that they cannot reconcile themselves to believe that this ship will fly 70 miles per hour, as claimed. First they say they doubt the ability of the longerons to withstand the thirty strands of rubber, fully wound, without extreme warpage. Second, they think the tail flutter is unavoidable in such a light structure and at the speed the model will travel. Next, according to the block size, they say the theoretical pitch is only 7.35 inches, and therefore, in order to travel 70 miles per hour, the propeller would have to develop 10,000 revolutions per minute. Fourth, they say the approximate cruising speed of a machine with this wing loading and wing area is ten to fifteen miles per hour, and with any increase in wing loading there is an increase in the speed.

Let's look over these questions and see if we can answer them and clear up any misconceptions. First we can verify the fact that this model has been wound to full capacity of thirty strands of rubber. Any warpage of the tail, that is, twisted sideways, is an old trick which prevents the model from turning extremely. If the tail is warped enough to the left, the pro-

peller is turned to the right. The tail warpage compensates for the propeller torque. This trick was used by your editor as long ago as 1922, in order to secure straight flights. In the second question we wish to correct the erroneous opinion that tail flutter is a direct result of high speed. Such is not the case. Flutter is a result of a vibration in the air flow synchronized with a periodic bending moment of the tail. Tail flutter does exist sometimes at high speed but not always. In this case it does not exist inasmuch as your editor tested this ship and knows from experience. If the air flow is smooth over the tail, flutter should not result in any case. In the third question, the writers have made a mistake in their calculation of pitch, or rather in determining the block size from which this prop was cut. If they will read the article which is appearing in this issue on pages 28 and 29 they may possibly see the point at which they are in error. We refer them to diagrams 30A and 30B. The pitch of this propeller would come closer to thirteen than to seven inches.

In the fourth comment the writers are very much in error. With this wing loading the minimum or normal flying speed of a plane *can be* ten or fifteen miles per hour. This does not mean that a higher speed does not exist with excessive power. The rule is that the square root of the minimum flying speed of a ship is proportional to the wing loading. It would be correct to say that this ship can fly as slowly as ten or fifteen miles, but with sufficient power there is nothing to prevent it from flying seventy miles per hour. In conclusion we can say that this ship has actually performed in the manner that was stated.

CLUB NEWS

Ohio

In picture No. 12 we see Mr. Ed. Clarke, Junior Aviators National Director, congratulating Albert Broz, who won the original design contest at the Junior Aviators National Contest, held at Cleveland, Ohio. Broz is holding the winning model, which is most unusual in design. Though it may not be seen clearly in the picture, the ship is a two-motored job with one propeller at the nose and one at the tail. The motors are enclosed in separate fuselages which have been spliced together. The tail of the forward fuselage is fastened to the top rear surface of the lower fuselage, sort of a double plane effect. We are sorry that we have no picture of this ship in flight.

"Gas Lines"

(Continued from page 17)

benefits you will receive will be forwarded to you.

"Gas Lines" under the new organization will not be discontinued. It will be the news column of the new N.A.A. Gas Model Division, just as it is now the news column of the I.G.M.A.A.

Any comments or suggestions concerning this new program will be gratefully received by the chairman of the board of the gas model division, Mr. Charles Hampson Grant. Address all letters to him care of MODEL AIRPLANE NEWS, 551 Fifth Avenue, New York City.

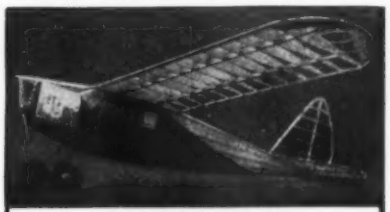
Now we have some interesting news of gas model building activity. Picture No. 1, at the head of the column, shows the extent to which gas model flying has been carried. This Red Zephyr was built by John Ross of Green Harbor, Massachusetts. Ross is exceedingly pleased with the performance of this ship taking off from water. It was not a mill-pond if we are to judge from the picture. It appears as if the plane is headed for a transatlantic flight. Ross says:

"It took off in about five yards and headed almost straight up for the clouds. At about seventy feet it levelled off, the wing dipped, and how she dove into the water! The wing hit first but there was not even a tear in the silk. The body was damaged, but it is now fixed and ready for flight again."

Ross is now waiting for suitable flying weather to make further tests.

We find that hydro gas models are becoming more popular with the passing of time. In nearly every case excellent flying qualities in such ships have been shown. Picture No. 2 shows a racing job built by Bob Baker of 847 Cardiff Avenue, San Bernardino, Calif. The ship was designed by Bill Atwood, one of the leading builders on the Pacific coast. The plane weighs 3½ pounds complete. The design from an aerodynamic standpoint is just about perfect. The center of gravity and center of lateral area are in their proper relative positions, and the thrust line is above the center of gravity. Atwood is one of the foremost designers of gas models in the country and always places high in contests when he enters. Mr. Baker, who is a member of unit No. 9 of the I.G.M.A.A., would like to correspond with model builders who would care to write him.

Picture No. 3 is one of the most unusual



THE CHIEFTAIN
7 ft., 4¾ lbs.
One of the steadiest fliers, over 700 successful flights, complete in all respects: full-size wood, plans, wire, cement, dope, bamboo paper, blocks, wheels, etc., etc., etc.
STANDARD SET, ONLY.....$4.00
DE-LUXE SET, ONLY.....$7.00

THE BUHL PUP
7 ft., Wt. 5 lbs.
This kit contain full-size wood; plans, cement, paper, etc., same as Chieftain.
STANDARD SET, ONLY.....$4.50
DE-LUXE SET, ONLY.....$7.50

Special Prices
THE STARLET
6½ ft., Wt. 4 lbs.
The best ship of them all complete and guaranteed in all respects full size strips; plans, cement, dope, etc. Same as our Chieftain set.
STANDARD SET, ONLY.....$3.00
DE-LUXE SET, ONLY.....$5.75

ALL OUR DE-LUXE MODELS
contain in addition to the regular materials supplied in each kit: 1 finished carved propeller, 1 pair airwheels, 1 set cut-out ribs; 2½-pint cans of any colored dope. Buy the DeLuxe models and save money.

GAS MODEL SUPPLIES AT PRICES THAT DEFY COMPETITION

LUMBER GAS MODELS—ALL FIVE FOOT LENGTHS
The following wood can be had in Spruce, Bass, or Balsa at the same prices those listed below.
1/8x1/8 .....$ .03
1/8x1/4 ..... .03
1/8x1/2 ..... .07
3/16x3/16 .. .05
3/16x3/8 .. .05
3/16x1/2 .. .07
3/16x1 ..... .08
1/4x1/4 ..... .05
1/4x1/2 ..... .06
1/4x1 ..... .10
3/8x3/8 ..... .09
1/2x1/2 ..... .10
1/4x1 ..... .18
1x1 ..... .25
BAMBOO PAPER 24"x36" sheet .05

SHEET BALSA (Special for Gas Models) 36" Lengths
1/16x2 .... .04
1/16x3 .... .06
3/32x2 .... .05
3/32x3 .... .09
1/8x2 ..... .07
1/8x3 ..... .09
3/16x2 .... .07
3/16x3 .... .11
1/4x2 ..... .09
1/4x3 ..... .13
3/8x3 ..... .18
1/2x3 ..... .30
For Five Foot Lengths in Sheet Balsa, Double Three Foot Length price.

REED
1/4", 3 ft. for .05
3/16, 3 ft. for .07
1/4", 3 ft. for .10
BIRCH DOWELS 36" Lengths
3/16 dia. .. .04
1/4 dia. ..... .05
SPUN ALUMINUM WHEELS
5" dia. per pair only $1.50
GAS MODEL WHEELS
Special pneumatic wheels good for gas model from 3" to 8" size
3½". Price pair $1.50
Carved Props for any Motor, each only $1.00
TOGGLE (ON-OFF) SWITCHES, 45c
MINIATURE KNIFE SWITCHES
2 poles..25c each
3 poles..35c each
SHAPED PROPELLER BLANKS
Specify size of prop & Motor, each only 25c
CEMENT & DOPES
These liquids are specially made for gas powered models and should not be confused with those used for rubber powered models.
4 oz..... .18
1 pt..... .60
1 qt..... 1.00
Gas Model dope and paper adhesive same price as cement.
SILK
DURAL ANGLE BEAM
1/2"x1/2" foot .20
3/4"x3/4" foot .30
SPRING STEEL WIRE
(In five, 5-foot lengths)
1/16 dia. 5' .05
3/32 dia. 5' .15
1/8 dia.. 5' .25
COLORED DOPE
All Colors
4 oz..... .20
1 pt..... .65
SHEET CELLULOID
12x16 sheet .18
MODEL MAKERS KNIFE
each .10
SHEET ALUMINUM
1/32",6"x8" .15
1/16",6"x6" .28
SPECIAL JAP SILK
Grade A silk per yd. .... .40
A. C. PLUGS
Each .....$ .65
GAS MODEL TIMERS
(Like Auto-Knips 1¼ oz. wt.)
Each $1.25
MODEL MAKING PINS
per 100..... .05
T Pins 50 for .10
BROWN JR. PLUGS
Each $1.00
GAS MOTOR COWLS
6½ ea.....$ .90
8" ea.....$1.25
NUTS & BOLTS
2-56" 1", 1¼"
1½" Long.
Per doz.....$ .15
WOOD SCREWS
½", ¾", 1"
Per doz.....$ .05
ALUMINUM RIVETS (Lightweight)
1/16 x ¼ per doz. .....$ .05
3/32 x 3/16 per doz. ..... .05
¼ x ¼ per doz. ..... .05

RUBBER-POWERED SUPPLIES AT LOWEST PRICES

18" BALSA
1/16x1/16 ..... 100, 5c
1/16x1/8 35 for 5c
1/16x3/16 ..... 18, 5c
1/16x1/4 15 for 5c
1/16x1/2 5 for 5c
3/32x3/32 ..... 30, 5c
1/8x1/8 30 for 5c
1/8x3/16 12 for 5c
1/8x1/4 10 for 5c
3/16x3/16 ..... 8, 5c
1/4x1/4 6 for 5c
1/4x1/2 3 for 5c
1/2x1/2 2 for 5c
18" SHEETS
1/64x2 8 for 10c
1/32x2 8 for 10c
1/16x2 8 for 10c
3/32x2 7 for 10c
1/8x2 6 for 10c
3/16x2 3 for 9c
1/4x2 3 for 10c
2" sheets or 36" lengths, double above prices; add 10c packing charge for 36" lengths.
18" PLANKS
1x1 5c; 1/2x2 6c
1x1½ 9c; 1x2 10c
1x3 13c; 2x2 18c
2x3 23c; 2x6 30c
3x3 40c; 3x6 75c
PROP. SHAFTS, REAR HOOKS
doz. 8c
CELLULOID
6x8 ..... 5c
12½x16 ..... 18c
ALUMINUM
.0003x3½ 6ft 5c
.005 in. 6x6 5c
.010 in. 6x6 6c
PROPELLER BLOCKS
1/2x 3/4x 5 8—5c
1x 3/4x 6 6—5c
5/8x1 x 7 4—5c
3/4x1 x 8 3—5c
3/4x1 1/4x10 2—5c
3/4x1 1/4x12 3c ea.
1x1 1/4x12 4c ea.
1x1 1/2x15 6c ea.
DUMMY RAD. ENGINES
1½" d. 18c; 2" d. 20c; 3" d. 25c.
REED
1/32-1/16-1/8 .....6 ft. for 3c
BAMBOO
1/16 sq.x12, 36, 5c
1/16x1/4x11, dz. 10c
RUBBER
.045 ....25 ft. 5c
1/16 sq., 20 ft. 5c
1/8 flat..18 ft. 5c
Skein 50c
WASHERS
1 dz. 1/4 or 1/4 1c
THRUST BEARINGS
Small ....doz. 10c
Large ....doz. 15c
NOSE PLUGS
1/8" .....doz. 8c
3/8" .....doz. 15c
WIRE
6-8-10-12-14 .....6 ft. 3c
DOWELS
1/16x6 ..doz. 5c
1/8x18...2 for 3c
3/16x18..2 for 5c
WOOD VENEER PAPER
20x30..1 for 10c
ALUM. TUBING
1/16, 3/32, 1/8 ..... ft. 7c
3/16 or 1/4 ft 10c
WHEELS per pr.
Birch Bias Cellu
1/2 .01 .03
3/4 .02 .04 .05
1 .03 .05 .07
1 1/2 .04 .08 .10
1 3/4 .07 .10 .16
3 .20 .15 .30
CAMEL'S HAIR BRUSHES
Small 3c; Lge. 5c
Extra large.....8c
PURSUIT MACH. GUNS
3/4", 1 1/4" or 1 3/4" each 5c
METAL PROPELLERS
2 blades 3 blades
1 1/4" 3c 8c
2 1/2" 10c 10c
3 1/2" 15c 20c
4 1/2" 20c 25c
SANDPAPER
5 sheets.....5c
3/4" 4c; 1 1/4" 7c
3" 12c
CELLULOID PANTS, per pair
1/2" to 1" .18c
1 3/8" to 1 3/4" 33c
ALUM. COWLINGS
1 1/2" 15c 2" 18c
3" 25c 4" 40c
Specify whether anti-drag or closed
MACHINE-CUT BALSA PROPS
5" 4c; 6" 5c; 7" 6c; 8" 7c; 10" 8c; 13" 10c
15".....15c
ENGINE AND COWL (Cellu.)
1 1/2" dia. 18c
2" dia. 20c
3" dia. 25c
CLEAR DOPE OR BANANA OIL
1 oz. 5c 2 oz. 7c
4 oz. 13c 1 pt. 45c
Thinner same price as clear dope
COLORED DOPE
White, yellow, orange, blue, red, green, olive grn. black, silver, gold, 1 oz. .06 2 oz. .10
4 oz. .19 1 pt. .65
COLORLESS CEMENT
1 oz. .05 2 oz. .08
4 oz. .15 1 pt. .50
TISSUE, AA
All col., doz. 10c
Silver .....ea. 5c
Superfine, wh. 5c
BUSHINGS
All sizes doz. 5c
WIND. WATER SPRAYER 13c
MODEL PINS
1/2" or 1" pkg. 5c
WING AND TAIL LIGHTS
12" 10c; 15" 15c; 24" 20c.

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We are pleased to announce that due to an enormous increase of business activity during the last few months, we have extended our production facilities 100%. This new policy will eliminate any delay in shipment which may have occurred in the past.
We Can Now Guarantee 24 Hour Service!

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Write for Discounts

FREE PREMIUM COUPONS with all orders from HEATHE. These coupons can be exchanged for AIR WHEELS, GAS MOTORS and many other valuable gifts. Coupons and catalog with every order.

NEW MOTORS FOR OLD!!
Send us your old motor—with your order for a new one. We will air-mail you our appraisal value. If satisfactory to you, we ship new motor at once. If offer is not satisfactory, we will return your old motor.

How to Order
Add 15c to orders under $1.50. Orders over $1.50 add 10% of order. Add 20c to all orders that contain balsa or wire in 5-foot lengths to cover special handling. For 36" lengths add 10c extra.

HEATHE MODEL AIRPLANE CO. 436-M-2 East 98th St. Brooklyn, N. Y.

gas jobs we have ever seen. It has no tail but instead has a propeller mounted on outriggers extended forward from the wing and landing gear. It is a pusher wing arrangement with a tractor propeller. This ship was built by Buck-Private W. F. White of Troop F, 4th Cavalry, Fort Meade, South Dakota. He is a member of Unit No. 19. He calls the ship "The Brainstorm" and is known as a speed demon. It was developed from a number of years of experimenting with rubber-powered models. First it was built as a rubber model, in which form it flew nicely. Although as a gas model it did not fly so badly, it did not have a chance to show its qualities as a mistake was made by flying it in a wind. White says:

"I don't know what it was, but the grief of it must have gotten me, for I up and joined the Army. Since then I have not done as much model work. The plane was originally designed by William D. Durand and drawn up into a gas model by myself.

"Some of the features are an aluminum and celluloid cockpit with a removable cover, a switch located on the dashboard, a motor cowling which is in two pieces and which may be removed by removing two screws. The plane is constructed almost entirely of spruce, with the exception of the wing panels which are covered with balsa. The rudder is adjusted by a sort of a tiller-bar ratchet arrangement. The front wing adjustment is obtained by a bolt and nut arrangement on the trailing edge."

Frank Jeffers of 1940 West 83 Street, Los Angeles, Calif., sends us picture No. 4. It is the fifth gas model in two years which he has built. He tells us he is going to enter it in one of the meets held in California. The ship is a very neat job and is exceedingly well designed. One of the features is the cantilever landing gear. You will note the I.G.M.A.A. insignia on the side of the fuselage. The ship is powered with a Mighty Midget engine.

Walter F. Staff of 154 East 13th South Street, Salt Lake City, Utah, writes and tells us something about his seven foot, four inch Buccaneer. He is shown with it in picture No. 5 on the sands of the salt flats at the edge of Great Salt Lake. He tells us the plane weighs five pounds and is equipped with an Autoknips kodak timer, which is visible just below the windows in the cabin. The model has made over 250 flights with the same propeller. The longest flight is sixteen minutes on ¾ ounce of gas. Model builders in the east will probably look at this picture and sigh for a flying field such as the one shown.

In picture No. 6 we have a little action. It shows George D. McLaughlin of Yakima, Washington, Rt. 1 Terrace Heights, a member of Unit No. 57, trying to outrun his gas model which is disappearing in the distance. It doesn't look as if McLaughlin is going to have much of a chance in such a competition. The ship is an eight foot scale model of a Monocoupe "90." McLaughlin tells us a little about it:

"On June 4th, after installing a Brown motor, it made a wing-over and power-dive from approximately fifteen feet, causing considerable damage to the nose. This was during a contest at which several planes crashed due to a gusty wind so the fault could not be traced.

"On August 24th, after raising the thrust line and streamlining the nose, two very stable flights were made on a 30 second motor run. One lasted 55 seconds, the other 1 minute, 10 seconds. Both times the plane landed on the same runway with no damage whatsoever.

"On August 26th, after a string test and a short flight on the timer, the tank was filled and the ship turned loose for a motor run of 4½ minutes, the flight lasting 9½ minutes. It reached an altitude of about 1500 feet, and finally landed undamaged in a large clump of tall grass.

"I have been using a one-bladed propeller made from a 16 inch Lorenzen Laminated and properly counterbalanced with lead. To my knowledge this is the first gas model to be flown with a one-bladed propeller."

It appears that model building is certainly not confined to the United States, for picture No. 7 shows Felix Montes de Oca of Constancia 127, Post Office Box 2686, Mexico City, Mexico, and his gas model of a Rearwin Speedster, powered with a Mighty Midget engine. It is certainly a beautifully constructed job. You can even notice that the wings' main ribs have lightning holes. Señor de Oca enjoys the distinction of being the first to introduce all kinds of model airplanes in Mexico and other Spanish speaking countries. He handles as a dealer all kinds of planes and supplies.

We hear from Charles A. Faraldo of Ormond, Florida, Box 285. Picture No. 8 shows a group of model builders from Deland, Florida, and their models Mr. Faralda is the second from the right, holding the T-D Coupe. His young son stands close by and is an able assistant and an ardent model fan.

Mr. Faraldo says that a club is being formed in Deland and he is starting one in Ormond and Daytona Beach. Finally one big club is going to be made of these groups. Large contests throughout the entire state are planned.

He tells us of an interesting flight made by Bob Nordman of Deland, Florida, Box 172, Route 1, with a Chieftain powered with a Baby Cyclone. Nordman is the boy holding the Red Zephyr in the picture. The story goes:

"One nice day towards evening, after it had rained, he thought he'd give the model a trial. It took off perfectly, and after gaining about a hundred feet the motor cut off. However instead of coming down it kept on climbing and soon started to go out of sight. We gave chase in a Cub. The model flew for one hour, ten minutes on one and a half minutes engine run. It finally landed in the swamps and required four weeks of search to find it."

In picture No. 9 we see Irwin G. Ohlsson of Los Angeles and Fred K. Hardy of Burbank, Calif., holding their prize winning ships. Hardy was the first place winner in the first Annual Aero I.T.I. Model Plane Contest, held on November 29th at the Aero Industries Technical Institute, the new aircraft industry training school in Los Angeles. Ohlsson was the second prize winner. The contest attracted hundreds of model builders of southern California and provided lively competition among builders of both gas-powered and rubber-powered models. Handsome trophies were awarded in both divisions.

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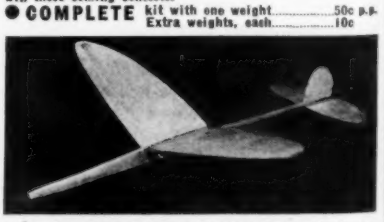

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Prize winners in the rubber-powered division were Bill Fox, of Los Angeles, first; and Don Wiebe, also of Los Angeles, second. All received trophies. Special award winners were William S. Rhodes, of Los Angeles; Ralph Pickard, of Hawthorne, Calif.; and Jack Bitterly, of Santa Barbara, California.

Judges of the contest were John K. Northrop, president of the Northrop Corporation and designer and builder of many famous military planes; Hall L. Hibbard, chief engineer of the Lockheed Aircraft Corp., and designer of the renowned Lockheed "14"; and Dr. Arthur Klein, professor of aeronautical science at the California Institute of Technology and consulting engineer for both the Douglas Airplane Company and the Northrop Corporation.

The contest was different from the usual competition in that no flying was required, the purpose of the contest being to bring out of the competing model builders the best of engineering, design, and workmanship. This was considered particularly fitting because of the fact that the sponsor, the Aero Industries Technical Institute, is preparing men for careers in the production end of the aircraft industry.

The contest was held coincident with the official opening of this new training institute, upon which occasion the school was formally accepted for the aircraft industry by Northrop, Robert E. Gross, president of the Lockheed Aircraft Corp.; and C. A. Van Dusen, vice president of the Consolidated Aircraft Corp. These aircraft executives compose an executive board set up to supervise the Institute's operation.

All model builders attending were permitted to go through the four buildings and extensive shops of the school and to observe the twenty-two phases of actual airplane manufacturing operations carried on in the Aero I.T.I. training program.

We have a letter from Bill Krecek of 228 South Kenwood Street, Glendale, Calif., who writes:

"Being a New Yorker, my home town is really a long distance off. I came out here in August to attend the mechanics school of Curtiss-Wright Institute. I've had occasion to visit the field in Los Angeles where, *every* Sunday morning, to date, gas model fans may be seen swingin' props, models churning up plenty of breezes and plowing up the dusty field."

Picture No. 10 was sent by Mr. Krecek and shows Hal Atkins of 6826 Sunset Boulevard, Hollywood, Calif. adjusting his three foot model, powered with a Trojan Junior motor. It weighs only 21 ounces, has silk covering with three coats of dope. It has an area of 216 square inches. The motor drives a nine inch propeller which pulls the ship along the ground for only a short distance before it makes a quick hop into the air. Mr. Krecek says it flies in left vertical banks, but doesn't lose any altitude. He says further:

"I have yet to see any model take cartwheels like this one does. I believe Hal has been flying this little job every Sunday for about four months, with only one break in the fuselage just in front of the tail assembly."

Mr. Harold Stofer of Indianapolis, Indiana, has been doing things. Picture No. 11 shows his three motored gas job. Two motors seem difficult enough, to operate, but Stofer appears to be a glutton for punishment, or perhaps he is a little smarter than some of us. To our knowledge this is the first three motored job in existence. It has flown for twenty seconds, at which point the motors were cut with a timer. Stofer says that the glide was not the best in the world, but considering the weight in the front of the plane this was to be expected. Stofer tells us that he has a two motored plane as well and it handles a little better than the tri-motored one. We believe that the flights of this ship will be improved with a little experimenting. Evidently the center of gravity is pretty well forward. This may be remedied by moving the wing forward or weighting the tail slightly in order to secure the proper balance.

Fred Schlumpp of 338 East 67 Street, New York City, sends us picture No. 12, showing two motors. The one on the right is a Brown Junior to which he has fitted a float carburetor. It can be run upright or inverted as may be desired. The body of the carburetor is of cast aluminum alloy in which is a balsa wood float. The motor on the left is one which Schlumpp built in his spare time. The bore is the same as the Brown, 7/8", and the stroke 5/8". This makes the displacement slightly smaller. Actually it is six c.c. in volume. The main bearing is quite long with an oil trap in the center. The cylinder is of steel to which the parts are brazed. The fins are of "Y" alloy shrunk on. Four long studs hold the head of the cylinder in place and allow it

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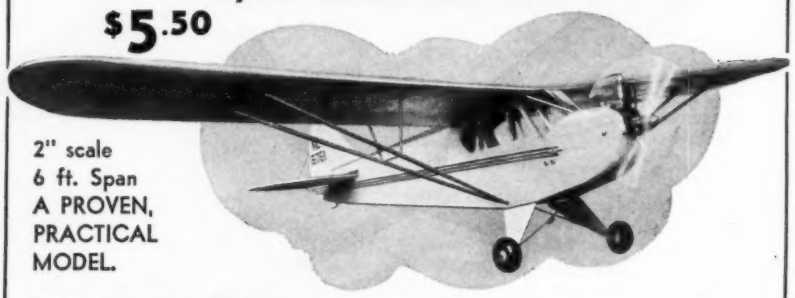

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to be taken off with ease. Schlumpp says the main trouble in making very small engines is the job of making a small spark plug. Therefore in his procedure he makes the plug first and then builds the engine around it.

UNIT NEWS

California

The Northern California Gas Model Association held its first gigantic gas model contest at Moffett Field, Sunnyvale, Calif., on Sunday, November 28th. This model association is composed of all the gas model clubs of northern California, which are all units of the I.G.M.A.A. Over 300 contestants took part. An entry fee of 50c was charged to help defray the expenses with the deficit made up from the Association's treasury. Many prizes were given including five motors. The Association donated a Univex Movie Camera and Projector Unit.

New York City

Metropolitan Model League Gas Model Contest

Closing the outdoor season the Metropolitan Model League held a gas model contest on Oct. 31. There were over 150 actual entries and the contest was considered by all as the most orderly meet ever conducted in the East. This was made possible by the co-operation of Major Alexander P. Seversky who donated the use of his private air field and 25 officers and men from Mitchell Field who acted as timers. A small entry fee was charged which enabled the committee to provide luncheon and dinner for the officials.

Two events were held—Controlled Flight Duration Event with a 35 second engine run and a Weight Lifting Event, also with a 35 second engine run. There were more prizes in this meet than in any previous League competition. They ranged from gas engines to plans and were presented by leading model manufacturers who are sincerely interested in the promotion of this hobby.

The contest was sanctioned by the National Aeronautic Association and the I.G.M.A.A. and was directed by Irwin S. Polk. The first gas model meet to be conducted by the League in 1938 will be held during Easter Vacation week in April.

The Metropolitan Model League is the largest I.G.M.A.A. Chapter in the country. Under the new organization plan by which the I.G.M.A.A. becomes the gas model section of the N.A.A. the Metropolitan Model League invites all those interested who reside in the Metropolitan area to join through the League since by being a large organization the League can do more for its members by way of contests, meetings, bulletins, etc. Those model builders, both rubber and gas models who wish to become affiliated with the Metropolitan Model League may join by applying in person or in writing to the League at 421 Seventh Ave., New York City.

Duration Event

1.	Joseph Raspante	5.02 2/5
2.	Roger Hammer	4.37 2/5
3.	Wm. Schreer	4.13
4.	Albert Moll	2.41
5.	Andrew Bristol	1.58

Weight Lifting

1.	Thomas Hintze	Seversky Trophy
2.	Roger Hammer	Mighty Midget Kit
3.	E. DeAngelis	Red Zepher Kit
4.	Jim McPheat	Small Prop Clock
5.	Shepherd Morris	Flying Quaker Kit

New York

A new club has been formed called the West Bronx Gas Model Club. It has just started with five members and they are desirous of increasing their membership. They invite any one in the vicinity who would like to join them to get in touch with George Alpert, 266 East 165th Street.

N.A.A. Jr. News

(Continued from page 26)

with the N.A.A., ten of the leading model builders met at the Charlotte Airport October 21st and organized the Charlotte Junior Chapter of the N.A.A., which includes in its Charter Membership Mac Barksdale, Bill Barksdale, Herbert Puckett, Allen Patterson, Harvey Henderson, Neil Skinner, John Shannonhouse, John Dow, John Scott, and Edwin Todd.

Through the courtesy of the Cannon Aircraft Corporation, a work room has been provided for the Charlotte Junior Chapter where they will meet and construct model airplanes.

Plans have been completed to construct a sailplane of their own design. They are most fortunate in having Johnny Crowell and Captain John S. Snyder, who have a great wealth of airplane construction and experience at their command, as their Senior Advisers, and who are helping them with this interesting model. Dr. Bernard Walker, Charlotte's expert amateur radio operator has interested this group in experimenting with controlling this model with radio in flight, which will be the first time this has been tried out in Charlotte. They will also experiment with a radio control on a gas model, and have progressed so rapidly with the gas job that this will be given a test flight in about ten days.

Several Contests, One Record

The 1937 Chicago Park District city-wide Gas Model Contest was absolutely rained out on the seventeenth of October which was the original date of this meet. However, the following Sunday was a "honey" and they had many fine duration flights. There were forty-four contestants and a crowd of some two thousand. Though no records were broken, there were many interesting angles on the meet. For instance, Walter J. Addems, who is a member of the Gas Model Aeronaut Club and the chief test pilot for the United Airlines, flew a four-foot span gas model of original design with a midget gas engine which he also designed and built. E. P. Lott, a pilot for the same Airline, also flew an original-design gas job. The Gas Model Aeronaut Club of the Chicago Park District won four out of the five major prizes, including first in the Duration Event.

An interesting note on the models was the fact that Hubert Bodinet's model took

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off on the runway at Harlem Airport and landed on the Ashburn Airport runway 22 minutes and 28.3 seconds later, which is approximately five miles away. That model must have been well trained. Imagine going five miles and then landing directly on the runway—that's good stuff! We'll bet he couldn't do it again if he tried! Carl Goldberg's model made the steepest climb but completed by far the worst crack-up.

Due to the fine cooperation of Fred Schumacher, the manager of Harlem Airport, and an efficient "pit" system which was employed, the meet was well run and a great success. The "pit" system allows no spectators on the field and each contestant is required to remain in a "pit" while not flying officially. Each contestant was given only five minutes in which to take off, after which time the timer was assigned to the next contestant. This system appeals to us as being a fine method of keeping things in order and preventing any accidents to persons or property.

Frank Nekimken worked as Contest Director, and judging from the results, he did a bang up job. He reports that the high time winners were seven-foot Megow "Quaker" models with individual changes. The winner of the Duration Event was Albert Solomon who received the Chicago Park District Trophy (1 year) for his prowess in the Open Class. Time: 27 minutes 31.2 seconds. The Consistency Event was won by Melvin Yates with the time of 40 minutes 40.8 seconds. Melvin received the Gas Model Aeronaut Club Trophy for his ability.

Another Gas Model Contest which was sponsored by the St. Paul Pioneer Press and St. Paul Aviation Club had to be put off from the seventeenth of October too. It must have been raining everywhere that day! There too the 24th was a grand day with lots of thermals.

Between three and four thousand people turned out to see this contest. There were fifty entrants. This meet met with such success that it is going to become a yearly affair. Bob Lee took first place in the 1/16 ounce loading and for this he received a trip to Chicago and back over the Northwest Airlines and a Trophy. First place in the 40 second motor run was taken by E. Hayme who won a Syncro Ace Motor. Francis W. Chaffee officiated as Contest Director. Bill Rochford, also of the N.A.A. gave a dinner for all the contestants. Plans for next year are even bigger and better, so it should really be *something*.

The Trenton Chapter of the N.A.A. held their first annual Gas Model Meet at Mercer Airport on October twenty-fourth under the able direction of Everett C. Plummer, who is, by the way, a State Police pilot. He was capably assisted by many other members of the N.A.A. and the New Jersey State Police. Spectators were very well handled by the latter and according to reports the meet was well handled and beautifully directed.

The winner of the limited fuel event was Edward Seegmuller who received the Kimberling Trophy and a cash award for his efforts. Charles Bossi of Philadelphia took first place in the timer event. For his success he received the Luscombe Trophy and a cash award. Charles represented the Quaker City Model Club which arrived in Trenton with a trailer loaded down with fourteen models. The Trophies spoken of just above are permanent and were donated by John A. Roebling's Sons' Company and the Luscombe Aircraft Corporation.

There were a total of 120 contestants representing four states and large but orderly crowd. Here again, next year is expected to be bigger and better, as this Meet is going to be an annual affair from this time forward.

On October 16 at Swope Park, Kansas City, Missouri, Sanford Clevenger made a Class C Autogiro flight of 21 and 2/5 seconds, as a Senior record. This flight was witnessed by E. L. Hughes, Contest Director for that area and R. J. Willoughby. Congratulations, Sanford, for having set a new mark!

The first meet of the San Diego Aeroneers brought forth six hundred spectators and twenty contestants. Although they did not have such good weather, they have made a good start toward many sanctioned meets, as a preliminary step to the Western States Meet which they are planning on next summer. The best flights were made by E. Weathers, Gas, R.O.G., A. Hems, Stick, Hand-launched and L. Webb, Commercial, R.O.G.

Scheduled Contests During December

December 4—Jordan Marsh-Boston Traveler bi-monthly indoor contest to be held at the South Armory, Irvington St., Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick, and Willis C. Brown.

December 11—The Philadelphia Gas Model Association will hold a gas model meet at the Northeast Philadelphia Airport under the direction of William S. Berry.

December 18—Jordan Marsh-Boston Traveler bi-monthly indoor contest to be held at the South Armory, Irvington St., Back Bay, Boston, under the direction of Albert L. Lewis, Gunnar Munnick, and Willis C. Brown.

December 18—The Philadelphia Gas Model Association will hold an indoor meet for the Senior group under the direction of Percy Pierce, Leroy Streeter, and Victor Fritz.

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Joseph Richter Remodels Plane

Joseph Richter of Glendale, Long Island, New York, writes N.A.A. headquarters that he plans to remodel the pictured plane to conform with the N.A.A. rules. He writes of the pictured plane: "My gas model is powered with a Forster engine. The wings are easily disassembled, as are the tail surfaces. The ship is built in two sections attached by springs and hooks. The power plant is also easily taken out of the ship, making transportation very simple." If anyone is interested in Joseph's work or plans on this ship, he can be addressed 7823 76th Street, Glendale, Long Island, New York.

Alexandria, Virginia, Boasts Entire Family of Model Builders

Stanley L. Potter, 113 Masonic View Avenue, Alexandria, his wife, his daughters, and his wife's father all build models and pretty swell ones at that. He visited headquarters the other day and showed us some pictures that proved his words. He tells us that when the plans of a model do not look as his wife thinks they should, she just changes them to suit herself. Now there's a lady with ideas.

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GIANTS-50c

EXACT 1″ SCALE – 30″ to 33″ WINGSPANS

Try to beat a combination like this—big 30″ to 33″ wingspan models—plus the thrill of building to exact scale—1″=1′. You bet these Comet kits are "Giants"—giants in size—giants in value! They have everything—actual working, shock-absorbing landing gears, and tailskids! Every one a masterpiece of correct, authentic design—easy to build—and how they fly! It takes Comet's tremendous volume and low manufacturing costs to give you outstanding values like these! See them at your Comet dealer—if you have no dealer, order direct, enclosing 50c, plus 10c postage.

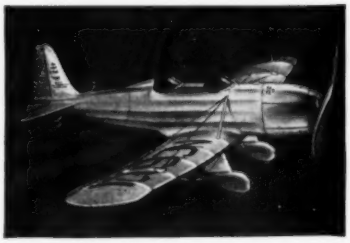
32″ Monocoupe No. 5A-175

33″ Waco S-6 No. 5A-177

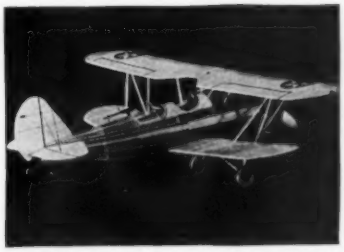
BIG in SIZE!

•

BIG in VALUE!



30″ Ryan St..... No. 5A-179



31″ Curtiss Wright Osprey No. 5A-160

31½″ Consolidated BT-7 No. 5A-178

The COMET GAS MODEL

FEATURES: DETACHABLE wings and tail assembly. Wings "give" in event of collision, to protect them. ADJUSTABLE RUDDER and elevator setting. ADJUSTABLE MOTOR SKID accommodates practically every motor on market. Thrust line can be varied. SHOCK-ABSORBING LANDING gear and tail wheel—exclusive with Comet. Prolongs life of model by absorbing landing shocks. Monocoque type, used by newest transports, chosen because of light weight, structural strength, and ease of construction. CURTISS ROBIN chosen because of unusual inherent stability and excellent flyability. MOTOR SKID gives in event of collision—protecting motor. REMOVABLE COWL and hatches for easy accessibility to motor, battery and wing springs.

SPECIFICATIONS

MODEL—Curtiss Robin

WINGSPAN—6 feet

OVERALL LENGTH—46″

WEIGHT OF MODEL—2 lbs. less motor

Power—any 1/5th or 1/6th H.P. motor

WHEELS—3½ in. air wheels

A SENSATIONAL VALUE!

$4.95 less airwheels and motor

Postage—east of the Mississippi, 30c; west of the Mississippi, 50c; none if ordered from Comet Dealer.

$6.50 with airwheels less motor

COMING! A SENSATIONAL NEW COMET GAS MODEL!

WATCH FOR IT!

GRUMMAN GULFHAWK

A sensationally complete model of the Grumman Gulfhawk which was made to order for Al Williams! EXACT SCALE—1″=1′0″. All controls movable from cockpit. Landing light controlled from cockpit. Cockpit hood slides; shock-absorbing tail wheel swivels and retracts. Landing gear also retracts. Many parts furnished complete or semi-complete; shaped struts, completed gas tank, shaped tail block, wheels and leading edges, even a decalcomania that dolls up the finished model like a million dollars! Highest quality selected Balsa and other material. Generous quantity of dope. A typical Comet value at only..... **$3.95**

Order from your dealer.

If no dealer, order direct: add 20c postage, 30c west of Mississippi. ENTER SCRIPPS-HOWARD GRUMMAN GULFHAWK CONTEST—$250 IN PRIZES PLUS SPECIAL COMET AWARDS!

BIG NEW CATALOG!

Out soon—newest, biggest edition of Comet catalog—page after page of new models and old favorites, fully illustrated and described, with technical and historical facts. 5c at your dealers, or send 5c in stamps to nearest Comet address.

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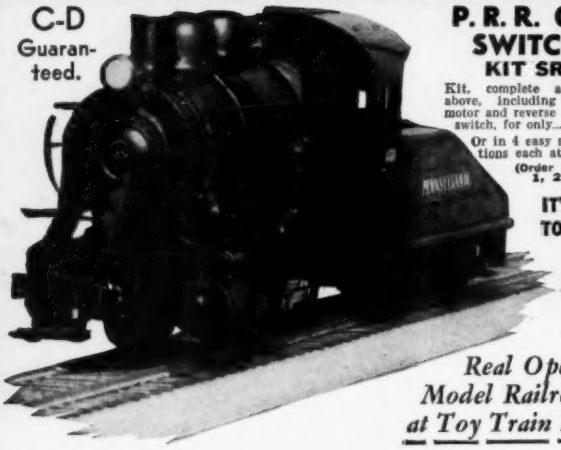
Now Build A C-D



C-D Guaranteed.

P. R. R. 0-6-0 SWITCHER KIT SRL-1

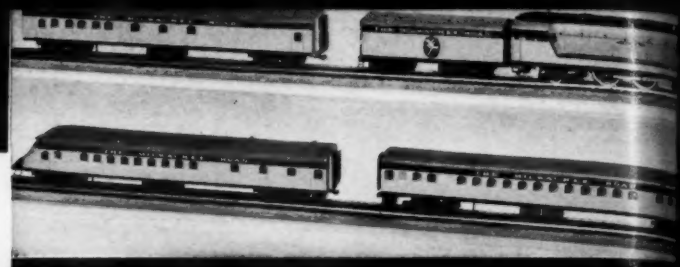
Kit, complete as described above, including motor and reverse switch, for only.... **$14.95**

Or in 4 easy sections each at..... **$4.00**

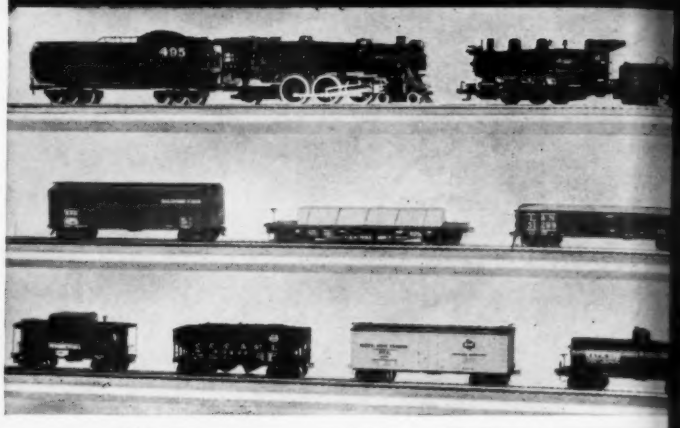
(Order by number—1, 2, 3 or 4)

IT'S EASY TO BUILD C-D'S RUNNING LOCO'S

Real Operating Model Railroading at Toy Train Prices!



Operating Model R.R



What You Get in C-D's Fine Line of Super Locomotive Kits

1. MAIN FRAMES: Die cast. Axle and gear holes completed.

2. DRIVE WHEELS AND TIRES: Beautiful Die castings with fibre insulator strip between them so any weight of counterbalance supplied (3 or 4 per wheel) may be put on any wheel desired as these are cast separately—a C-D feature!

3. DRIVE WHEEL AXLES: Steel shouldered and quartered (no mistake can be made in mounting wheels).

4. SIDE RODS: Die cast; unbelievably well detailed.

5. MAIN RODS: Die cast; fluted and well proportioned.

6. CYLINDER BLOCK: Die cast; a "hard job" done.

7. VALVE GEAR: Parts are completely punched to shape and small rivets supplied for simple assembly of a real working model valve gear (link is a neat little die casting).

8. CROSSHEADS: Die cast with piston rod integral.

9. POWER TRANSMISSION: Special 30 or 35 to 1 brass worm and bakelite worm gear supplied with set screws.

10. MOTOR: Heavy duty A.C. 10 to 12 volts, reversible. May also be used on D.C. but not reversible by changing polarity.

11. REVERSE SWITCH KIT: All parts finished requiring only hand assembly. (A beautiful little gadget.)

12. MOTOR MOUNT: Stamped of brass, adjustable in all directions—extra sturdy.

13. BOILER: From front to fire box turned of clear hard wood with holes drilled in top to fit stack and domes which are also turned of hard wood well detailed where possible. Easy to sand to correct fillet shapes. Beautifully embossed coverings with scale rivet heads supplied for fronts, smoke and fire boxes.

14. FIRE BOX AND CAB: Made of special .020 thick 3 ply wood. This comes printed out* and requires only cutting out with scissors and knife. This is a feature all model builders will like because it is easily glued together and **not soldered.** (You've almost all asked for more solderless methods, so here they are).

15. BELL: Turned brass realistically left natural color.

16. HAND RAIL POSTS: Turned Brass, most accurate made.

17. HAND RAILS AND PIPING: Brass rod supplied for these.

18. TENDER: Solid block of pine bandsawed to shape (this weight is needed when running train in reverse) requiring only a little sanding to finish. We supply a specially detailed covering for the tenders with the name of the railroad and scale rivets embossed to make the finest looking tender anyone could desire.

19. TENDER TRUCKS: Cast side frames, punched brass bolsters, shouldered axles, turned fibre insulating bushings and die cast wheels. Only a short time is needed for assembling these.

20. COUPLERS: Die cast, solid operating, nicely detailed.

21. LEAD TRUCKS: On 4-6-0 only, die cast.

22. DETAILS: Headlight, smoke stacks, domes, reverse gear cylinder, reserve tanks, generators, etc., are **precision turned** wood parts.

23. INSTRUCTIONS: We supply a large full size minutely detailed C-D quality printed drawing with very explicit instructions on all phases of construction.

24. AND TO COMPLETE THE KIT: Absolutely all screws, nuts, bolts, rivets, washers, "piping," detail brass rods (three sizes), strips, etc., etc., also metal primer, cement and black—absolutely everything needed except the simple assembling tools required. (For those who do not have the 7 small drills and 2 taps needed, we'll supply one set suitable for all C-D designs for only $2.25. Hand drill 45c, tap wrench 25c. Parts packing charge 15c if not ordered with kit).

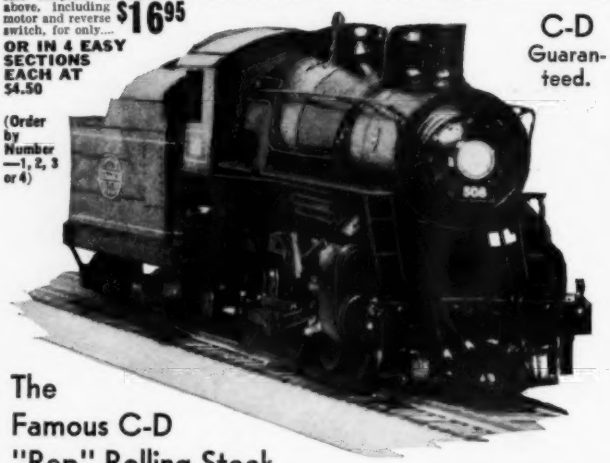
*When we use the term "Printed out," we mean the full size patterns are actually printed on the wood, eliminating any layout work, just start cutting when you open the kit.

C.G.W. 4-6-0 (10 wheeler) —KIT SRL-3

Kit complete as described above, including motor and reverse switch, for only.... **$16.95**

OR IN 4 EASY SECTIONS EACH AT $4.50

(Order by Number —1, 2, 3 or 4)



C-D Guaranteed.

The Famous C-D "Rep" Rolling Stock

(Cars Convertible To Operating Equipment)

Average over all sizes, Locomotives, 12"-17"; Passenger Cars, 15"; Box Cars, 8"; height, 2½", to C-D 3/16" scale, ⅞" gage.

RL-1	PRR Switcher, 0-6-0 and Tender	$ .65
RL-2	C&O Pacific (4-6-2) Locomotive and Tender	.85
RS-1	Hiawatha (4-4-2) Locomotive and Tender	.95
RS-2	Hiawatha Tap-Dinner Car	.75
RS-3	Hiawatha Coach	.75
RS-4	Hiawatha Beaver Tail Car	.75

BOX CARS

RB-1	NYC—40 ft. steel (NYC Herald)	.45
RB-2	B&O—40 ft. steel	.45
RB-3	B&O—40 ft. wood	.45
RB-4	Rock Island—40 ft. wood	.45
RB-5	Wabash—40 ft. wood	.45
RB-6	Southern Pac.—40 ft. wood furn. car (SP Herald)	.45
RB-7	(Discontinued)	
RB-8	Texas & Pac.—40 ft. wood auto	.45
RB-9	AT&SF—40 ft. wood (Santa Fe Herald)	.45
RB-10	(Discontinued)	
RB-11	Union Pac.—50 ft. steel	.55
RB-12	AT&SF—50 ft. steel auto (Santa Fe Herald)	.55

CABOOSE

RC-1	PRR type N-5	.45

GONDOLA TYPE CARS

RG-1	L&N—41 ft.—50 ton, Class G.A.	.35
RG-2	NYC—41 ft.—50 ton black, Class G.A. (NYC Herald)	.35
RG-3	MC—41 ft.—55 ton. Class G.A. (NYC) Herald)	
RG-4	T&P—41 ft.—50 ton, Class G.	
RG-5	PRR—65 ft.—70 ton, Mill Gondola, Class G.M. (PRR Herald	

FLAT CARS

RF-1	C&NW—46 ft.—50 ton	
RF-2	PRR—46 ft.—50 ton	
RF-3	B&M—46 ft.—55 ton	
RF-4	L&N—46 ft.—50 ton	

HOPPER TYPE CARS

RH-1	CCC&StL—55 ton, Twin Hopper, Class HM (NYC Herald	
RH-2	MP—55 ton, Twin Hopper Class HM (MP Herald)	
RH-3	Southern—55 ton, Twin Hopper, Class HM	
RH-4	Illinois Central—50 ton, Twin Hopper, Class HM	

TANK CARS

RT-1	Texaco—TCX (white) 8,000 gal.	
RT-2	NATX (black) 8,000 gal.	
RT-3	Sinclair—SDRX (black) 8,000 gal.	
RT-4	Gulf—GRCX (black) 8,000 gal.	

Airplane Type Construction

These "Rep" models show how beautifully all details may be incorporated as easily as in larger scales—practically all advantages in layouts as in larger gages. While all are "dummies" or "atmosphere," cars may be converted later to run on either 2- or 3-rail systems. All super detailed.

These Kits are all dry—no cement, colors are included with them. The models they build are known as Representative (Rep) models. By simply employing couplers, detaching the dummy trucks and replacing them with actual trucks, all your "Rep" (cars only) can be used on your "Super Model."

1938 Catalog

with Complete Present C-D Rail Information—tracks, ties, spikes, operating trucks, couplers, etc.—BUT Let This Delay The Possibility Of Getting Started—SEND YOUR ORDER TODAY!

O-Gage Tinplate Uses! The only way in which any C-D equipment may be used with tinplate "0" gage toy equipment (not ¾" or 17/64" scale equipment) is freight car bodies. By simply attaching trucks and couplers from toy equipment, C-D equipment will really "fit-in" with the over-all length, width and height of tin "0" gage equipment. Locomotives could not be very well employed without considerable revamping, requiring your own ingenuity. Generally we recommend nothing but freight cars.

Ordering Instructions: *If your dealer can't supply you, order direct. All orders subject to our regular shipping terms. Send check or M.O. (cash at own risk). No C.O.D.'s. Canada, Mexico, British Isles, add 10% extra; all other countries, 20%. Include 10c for No. 3 Catalog.*

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